West Coast Queen Charlotte Islands Groundfish Bottom Trawl Survey, September 11th to October 17th, 2007

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Fisheries and Oceans Canada
Science Branch, Pacific Region
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Nanaimo, BC
V9T 6N7

2008

Canadian Manuscript Report of Fisheries and Aquatic Sciences 2823

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2008-03538/

Canadian Manuscript Report of
Fisheries and Aquatic Sciences 2823

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by

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Cat. No. 97-4/2823E ISSN 0706-6473

Correct citation for this publication:

Workman, G.D., Stanley, R.D., Olsen, N., and Rutherford, K.L. 2008. West Coast Queen Charlotte Islands groundfish bottom trawl survey, September 11th to October 17th, 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2823: vi + 45 p.

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ABSTRACT

Workman, G.D., Stanley, R.D., Olsen, N., and Rutherford, K.L. 2008. West Coast Queen Charlotte Islands groundfish bottom trawl survey, September 11th to October 17th, 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2823: vi + 45 p.

A bottom trawl survey of the west coast of the Queen Charlotte Islands was conducted on the fishing vessel F/V Nemesis between September 11th and October 17th, 2007. The survey was jointly conducted and funded by the Canadian Groundfish Research and Conservation Society (CGRCS) and Fisheries and Oceans Canada (DFO). It was the second in what is intended to be a long-term survey series, coordinated with other area-specific surveys that together cover the continental shelf and upper slope of most of the British Columbia coast. The objective of these surveys is to provide fishery-independent abundance indices of all demersal fish species available to bottom trawling, as well as to collect biological samples of selected species.

The survey conducted 112 successful tows from a total of 116. The mean catch per successful tow was 799 kg, averaging about 17 different species of fish and invertebrates in each. The most abundant fish species encountered was Pacific ocean perch followed by rougheye rockfish, and silvergray rockfish. Biological data, including individual length, weight, sex, maturity, and age structure, were collected from 48 different species of fish. Oceanographic data and net geometry were also recorded for most tows, including water temperature, depth, headrope height, and doorspread.

Time constraints and inclement weather led us to remove the deepest stratum from the survey. This stratum, covering depths from 800 m to 1,300 m, was successfully surveyed during the 2006 survey and includes important habitat for fish species such as longspine thornyhead, sablefish, and Pacific and giant grenadier. These and other deepwater species will thus be absent or greatly underrepresented in the 2007 results.

RÉSUMÉ

Workman, G.D., Stanley, R.D., Olsen, N., and Rutherford, K.L. 2008. Relevé au chalut de fond des poissons démersaux sur la côte Ouest des îles da la Reine-Charlotte du 11 septembre août au 17 octobre 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2823: vi + 45 p.

Un relevé au chalut de fond a été effectué sur la côte Ouest des îles de la Reine-Charlotte à partir du bateau de pêche F/V Nemesis entre le 11 septembre août et le 17 octobre 2007. Le relevé a été effectué et financé conjointement par la Canadian Groundfish Research and Conservation Society (CGRCS) et Pêches et Océans Canada (MPO). Il s'agit la deuxième d'une série de relevés qui s'effectueront sur le long terme, en coordination avec d'autres relevés spécifiques à certaines zones qui ensemble couvriront le plateau continental et le versant ascendant de la plus grande partie du littoral de la Colombie-Britannique. L'objectif de ces relevés est d'obtenir des données indépendantes des pêches sur l'abondance de toutes les espèces de poissons démersaux accessibles au chalut de fond ainsi que d'obtenir des échantillons biologiques de certaines espèces choisies.

Au total, le relevé a permis d'effectuer 112 passages au chalut fructueux sur 116. Le poids total moyen des prises par trait de chalut était de 799 kg et on comptait en moyenne 17 espèces différentes de poissons et d'invertébrés par trait. L'espèce la plus abondante était le Sébaste à longue mâchoire, suivi par le Sébaste à œil épineux et le Sébaste argenté. Des données biologiques, notamment la longueur, le poids, le sexe, le degré de maturité, l'âge ont été recueillies pour 48 espèces différentes de poissons. Des données océanographiques et la géométrie des filets ont également été enregistrées pour la plupart des traits, notamment la température et la profondeur de l'eau, la hauteur de la ralingue supérieure et la largeur de la porte.

INTRODUCTION

In 2003 a report by the Pacific Scientific Advice Review Committee (PSARC) recommended development of fishery-independent relative abundance indices using bottom trawl surveys in British Columbia waters (Sinclair et al., 2003). As an initial step, the report recommended that a pilot survey be conducted in PMFC major areas 5A and 5B (Queen Charlotte Sound). This region was recommended in part because it is not covered by other bottom trawl surveys and it represents a significant portion of the commercial bottom trawl fishery.

The first Queen Charlotte Sound survey was successfully completed in the summer of 2003 (Olsen et al., 2007). Following that, additional surveys were planned for the west coast of Vancouver Island beginning in 2004, Hecate Strait beginning in 2005, and the west coast of the Queen Charlotte Islands beginning in 2006. These surveys are to be conducted on a rotating biennial schedule with the Queen Charlotte Sound and Hecate Strait surveys conducted in odd-numbered years and the west coast Vancouver Island and west coast Queen Charlotte Islands surveys conducted in even-numbered years. Together they provide comprehensive coverage of the continental shelf and upper slope of the British Columbia coast (Figure 1).

The first west coast Queen Charlotte Island survey was successfully completed in 2006 (Workman et al., 2007). The second survey was scheduled for 2008, however in 2007 an unanticipated funding source became available that enabled us to conduct an additional, previously unscheduled survey of this area. Delays in finalizing the contract led to a later than normal start for the survey (mid September as opposed to mid August), and this, in conjunction with work stoppages due to inclement weather meant that we ultimately had to remove the deepest stratum from the survey due to time constraints. This stratum, covering depths from 800 m to 1,300 m, includes important habitat for fish species such as longspine thornyhead, sablefish, and Pacific and giant grenadier. These and other deepwater species will thus be absent or greatly underrepresented in the 2007 results.

This document provides a brief synopsis of the 2007 survey, including the methods used and data collected. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results.

METHODS

VESSEL AND FISHING GEAR

The survey was conducted aboard the commercial stern trawler F/V Nemesis (Figure 2). The trawl net used was an Atlantic Western IIA box trawl (Table 1, Figure 3) connected to 1,477 kg 4.5 m^2 INJECTOR doors.

STAFF SUMMARY

A total of 14 personnel were involved in the survey, which was split into four sections of 7 to 14 days duration, with 9 personnel in each. The Canadian Groundfish Conservation and Research Society (CGCRS) provided funding for the crew of the Nemesis and employees of Archipelago Marine Research Ltd. (AMR). All other staff were funded by Fisheries and Oceans Canada (DFO) (Table 2).

SURVEY DESIGN

The study area consists of the west coast of the Queen Charlotte Islands, from approximately latitude 52° 45' N to latitude 54° 35' N, covering depths from 180 to 1,300 meters (Figure 4), and categorized into four strata (Table 3). The northern region, extending into Dixon Entrance, is nearly contiguous with the north-western most extent of the Hecate Strait survey except for a gap around Learmonth Bank (Figure 1), which we omitted from the survey to avoid catches of red tree coral (*Primnoa* sp.) that are common to that area.

We divided the survey area into a contiguous grid of 4 km^2 blocks and from these we randomly selected 145 primary fishing locations (Figure 5) based on a target allocation of 125. We arrived at the figure of 145 by calculating our per-stratum failure rates from 2006 and applying these factors to our 2007 allocation scheme to compensate for the anticipated rate of failure.

OPERATIONS

Fishing

Fishing commenced at 30 minutes after sunrise and ended at 30 minutes before sunset each day, where start and end fishing is defined as the trawl net on, and off bottom, respectively. This yielded an average working day length of about 10 hours.

On each day prior to fishing, the captain and chief scientist reviewed the list of fishing locations to determine a candidate set of locations to visit throughout the day. During this review process the captain would sometimes determine, based on his experience and knowledge of an area, that one or more locations were not fishable. In such cases we would mark the locations as "rejected based on prior knowledge". After compiling a list of candidate locations to be visited, the captain would then plan the most efficient route of travel between locations.

We frequently began fishing immediately on arrival at a fishing location. However, if the captain was not familiar with an area we would "sound" the region

(traverse the location and examine the depth sounder trace) to determine if it was suitable for trawling. If it was not, we marked the location and "rejected based on inspection".

When trawling, the captain would attempt to tow through the center of the 4 km^2 fishing block, usually following a depth contour. However, where the bottom topography made this difficult or impossible, the captain would trawl wherever he felt he could obtain a successful result, with the stipulation that at least half of the total trawl track had to be within the 4 km^2 block. The scope used in 2007 is shown in Table 4 and Figure 6.

To determine the start of each tow, we monitored the real-time net sensor data to establish when the net reached the sea floor and the headrope collapsed to a height of about three to four meters, at which point we considered the net to be actively fishing. Targeted on-bottom time was 20 minutes for shallow tows (those in water less than 500 m deep), and 40 minutes for deep tows. Net haul-back was done two minutes prior to the end of the shallow tows, and five minutes prior to the end of the deep tows in order to compensate for slack in the warps, which creates a lag before the net leaves the bottom. Although our target on-bottom time was 20 minutes for shallow tows and 40 minutes for deep tows, we accepted tows that were at least 15 minutes and 30 minutes, respectively. This was a pragmatic decision that allowed us to retain many tows that would otherwise have been failures due to hang-ups or early haul-backs.

The result of trawling was either a successful tow, or a hang-up or tear-up of the trawl net. In the event of a hang-up or tear-up, we would either mark the location as "rejected after one or more attempts to fish" or make additional attempts to fish. Thus, we kept records of the three scenarios that resulted in a location being removed from the sampling frame:

- Rejection based on prior knowledge
- Rejection based on on-ground inspection
- Rejection based on one or more failed fishing attempts

Rejected locations were removed from the sampling frame for the current and all future surveys. Thus, every year of the survey results in the removal of some unfishable area, which over time, will lead to increasing efficiency (i.e. we will spend less time surveying areas that cannot be fished).

Gear and Oceanographic Sensors

The trawl net was equipped with a variety of real-time sensors including doorspread and headrope height. These sensors transmitted data to a bridge computer once per second and allowed us to continually monitor the net during fishing. In addition to these real-time sensors, we also attached data-logging probes to collect water temperature, net depth, salinity, and dissolved oxygen (Seabird 39 and Seabird 19plus probes) and contact of the trawl net with the sea floor (MacMarine (NMFS) Bottom Contact Sensor).

Catch Processing

Codend contents were dumped into a large tank in the stern of the vessel, the tank was then flooded and fish washed into a sump and up a conveyor where they dumped

onto a second much longer conveyor belt. The catch was then completely sorted into baskets by species and weighed except when catches were too large to sort in a reasonable amount of time. In these cases catches were sub-sampled by collecting half belt lengths from the beginning, middle and end of the catch. A half belt length is the entire length of the conveyor with a uniform single layer of fish covering it (10 m long x 1 m wide, ~ 250 kg), a full belt length is one complete revolution of the conveyor belt. Sub-samples were sorted and weighed as they were removed from the belt. The total catch weight was estimated by counting the number of full belt lengths of fish that went into the hold and applying the species proportions and sample weights from the sorted 1 ½ belt lengths to the number of full belt lengths to arrive at an estimate of total catch by species. Several large, conspicuous, uncommon species were sorted in their entirety due to the low probability they would appear in the sub-sample, including all skates, large sharks, redbanded rockfish, shortraker rockfish, Pacific halibut, and Pacific cod.

Biological Sampling

While the primary purpose of the survey was to generate fishery-independent indices of relative abundance, our secondary goal was to collect associated biological information on the size, sex, and age composition of selected species. In particular, our biological sampling priorities were to collect length and sex frequencies on all species in the catch of each tow, subject to the minimum number of specimens and sampling frequency criteria (Table 5). Because several common species are encountered in almost every tow the frequency with which they must be sampled has been reduced to free up additional sampler time for other species. A frequency of three indicates that the species is only eligible to be sampled every third tow. The exception to this rule is when there is a very large catch of a species that is not eligible to be sampled; in this case a length by sex frequency sample is always collected.

From every tow one Length/Sex/Weight/Age sample and one Length/Sex/Weight sample was collected. We selected these samples from the dominant catch by weight in each tow with the overall objective of collecting approximately 300 ageing structures for each species. Once the target of 300 ageing structures had been achieved less dominant species in the catch were selected for age sampling. As well, certain species deemed high priority due to concerns over stock status were sampled preferentially from every tow in which they met minimum sample size requirements (Table 6). Otoliths were collected from rockfish and flatfish species while dorsal fins were taken from lingcod and Pacific cod.

BIOMASS INDICES

The relative biomass index of fish species captured in the survey was obtained by multiplying the mean catch density per stratum by the area in each stratum and summing over all strata:

$$B = \sum_{i=1}^{k} C_i A_i = \sum_{i=1}^{k} B_i$$

where C_i = mean catch density (kg/km^2) for species s in stratum i.

A_i = area of stratum i (km^2).

B_i = biomass of species s in stratum i.

k = number of strata.

The mean catch density (C_i) in each stratum was calculated by:

$$C_i = \frac{\sum_{j=1}^{n_i} \left(W_j / D_j w_j \right)}{n_i}$$

where W_j = catch weight (kg) of tow j in stratum i.

D_j = length (km) of tow j in stratum i.

w_j = mean net width (doorspread; km) of tow j in stratum i.

n_i = number of tows in stratum i.

One thousand bootstrap replicates with replacement were performed on the survey data to estimate bias corrected 95% confidence limits and relative error for each biomass estimate (Efron 1982), with relative error defined as the coefficient of variation (CV) of the distribution of the 1000 boot strapped estimates.

RESULTS

FISHING

We divided the survey into four sections of 7 to 14 days. This duration was short enough that we were able to retain a significant amount of the catch, which was sold fresh at the end of each leg, and also allowed us to rotate the science crews. The survey began and ended at the Pacific Biological Station in Nanaimo, while the mid-survey offloads and crew changes were performed in Prince Rupert.

From a total of 36 survey days, approximately 7 days were required for travel at the start and end of the survey, and for traveling to and from harbour during offloads and weather days, 4 days were required for offloading catch and changing crews, and 12 days were lost to inclement weather. Thus, we ended with a total of 13 full fishing days in which time we conducted 116 tows, of which 112 were successful and 4 were

unsuccessful due to hang-ups or tear-ups, for an average of about 8.6 successful tows per fishing day, or about 3 successful tows per survey day (Table 7).

The final status of the 2007 sampling frame includes 112 successfully fished locations, 21 locations rejected prior to fishing, 1 location rejected after one or more failed fishing attempts, and 11 locations that were not fished (Figure 7). These 11 un-fished locations are all located in the deepest stratum (800 to 1,300 meters), which we omitted from the survey due to time constraints. Analysis of this survey, especially in the context of the full survey time series, must take the omission of this deep stratum into consideration, as it results in the absence or underrepresentation of several fish species, including longspine thornyhead, sablefish, and Pacific and giant grenadier.

CATCH

Catch weight per tow was typically less than 2,000 kg, averaging 799 kg, and we usually observed about 12 to 20 species per tow (Figure 8 and Figure 9). We caught a total of 89,446 kg of fish and invertebrates. Most of this (89,167 kg) consisted of 77 different taxonomic groups of fish, including 23 rockfish taxa and 9 flatfish taxa. The remainder (279 kg) consisted of 57 invertebrate groups (Table 8). Of the fish species, Pacific ocean perch was the most dominant by weight, followed by rougheye rockfish, silvergray rockfish, and sharpchin rockfish (Table 9). Significant amounts of marketable fish, especially Pacific ocean perch, were offloaded with the proceeds helping to partially offset the costs of the survey (Table 10).

SAMPLES AND SPECIMENS

We sampled 63 species of fish for attributes such as length, weight, sex, maturity, and age structure (Table 11, Table 12, and Table 13).

GEAR AND OCEANOGRAPHIC SENSORS

We collected Seabird 39 data (water temperature and depth) from 114 tows (Table 14, Figure 10), and Seabird 19plus data (water temperature, depth, salinity, and dissolved oxygen) from 103 tows (Table 14). Although we have not yet analyzed these data in detail, they may prove useful for explaining, or at least correlate to, abundance trends. They will also be added to a growing database of oceanographic data housed at the Institute of Ocean Sciences, British Columbia, and made available to other researchers.

We collected bottom contact data, using the NMFS Bottom Contact Sensor, from 109 tows (Table 14). These data provide a record of the trawl net contact with the sea floor and thus are useful not only for determining the quality and duration of the sea floor contact, but also indicate the relative rugosity of the sea floor (Figure 11).

BIOMASS INDICES

Figure 12 shows the relative biomass indices of selected fish species from the 2006 and 2007 west coast Queen Charlotte Islands surveys. The species shown are those for which the relative error of the biomass index was less than 0.5. Each row of the figure gives the common name of the species, a small graphical depiction of the 95% confidence limits of the biomass index for each year (vertical bars) joined by a line

connecting the biomass indices, and finally, the numerical value of the biomass index for each year. Results are sorted in order of decreasing relative change in biomass from 2006 to 2007. I.e., species at the top of the figure exhibited the largest relative (proportional) increase in biomass estimate while those at the bottom showed the largest decrease.

Because estimates of biomass are highly influenced by estimates of the area covered by the survey, by estimates of mean doorspread, and by estimates of tow length, they should be not be considered as absolute indices of abundance but only as relative estimates. In addition, as the surveyed area will decrease over time due to the accumulation of unfishable regions, we can expect that the biomass estimates given in Figure 12 will not remain constant over time.

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Table 1. Gear specifications.

Part	Length	Material
Rigging		
Doors	1 pair	4.5 m^2 INJECTOR doors wegihing 3250 lbs. each
Pickups	19' 6"	7/8" cable
Door Legs	16'	5/8" chain
Sweep Line	90'	7/8" cable
Upper bridle	90'	3/4" cable
Lower bridle	90'	7/8" cable
Net frame		
Headline	74' 6"	11 mm Long link chain
Headline floats	89	8" plastic Spheres
Riblines		1 1/4 " Polysteel rope
Bolsch Line	68' 4"	1" poly steel rope
Fishing Line	107' 4"	11 mm Long link chain
Wing Lines	22' 3"	11 mm Long link chain
Foot Rope		
Foot Rope	107' 4"	11 mm long link Chain
Foot rope bosom	14'	18" tire gear spaced 6 in on center
Foot rope wing1	18'	18" rock hopper, 18 " disks spaced 21 " apart
Foot rope wing2	8' 8"	18" rock hopper, 18 " disks spaced 21 " apart
Wing extension	19' 8"	5" rubber disks in front of 18 " half egg
Web		
Belly	5"	3.5 mm Euroline premium
Square	5"	3.5 mm Euroline premium
Side Panel	5"	3.5 mm Euroline premium
Taper	4.5"	3.5 mm Euroline premium
Intermediate	4.5"	4.5 mm Euroline premium
Codend	4.5"	4 mm orange poly
Guard Mesh	4.5 or 5 "	Double 4.5 mm Euroline premium
Liner	3/4"	Notless Nylon

Table 2. Survey personnel for each leg of the survey.

Leg	Dates	Person	Role	Affiliation
1	September 11th to	Kris Ostrom	Captain	Nemesis
	September 18th	Greg Workman	Chief Scientist	DFO
		Jon Eis	Science	AMR
		Dan Erskine	Science	AMR
		Matt McKay	Science	AMR
		Sarah Tucker	Science	AMR
		Matt Christiano	Fishing	Nemesis
		Darwin Nash	Engineer	Nemesis
		George Sims	Fishing	Nemesis
2	September 19th to	Kris Ostrom	Captain	Nemesis
	September 25th	Kate Rutherford	Chief Scientist	DFO
		Jon Eis	Science	AMR
		Dan Erskine	Science	AMR
		Matt McKay	Science	AMR
		Sarah Tucker	Science	AMR
		Matt Christiano	Fishing	Nemesis
		Darwin Nash	Engineer	Nemesis
		George Sims	Fishing	Nemesis
3	September 26th to	Kris Ostrom	Captain	Nemesis
	October 3rd	Rick Stanley	Chief Scientist	DFO
		Aleksandra Bernauer	Science	AMR
		Dan Erskine	Science	AMR
		Jason Livingstone	Science	AMR
		Sarah Tucker	Science	AMR
		Matt Christiano	Fishing	Nemesis
		Darwin Nash	Engineer	Nemesis
		George Sims	Fishing	Nemesis
4	October 4th to	Kris Ostrom	Captain	Nemesis
	October 17th	Karina Cooke	Chief Scientist	DFO
		Aleksandra Bernauer	Science	AMR
		Dan Erskine	Science	AMR
		Jason Livingstone	Science	AMR
		Sarah Tucker	Science	AMR
		Matt Christiano	Fishing	Nemesis
		Darwin Nash	Engineer	Nemesis
		George Sims	Fishing	Nemesis

Notes: AMR = Archipelago Marine Research
DFO = Fisheries and Oceans Canada

Table 3. Definition of survey strata with the target and delivered tow allocation in each.

Depth Stratum Meters	Depth Stratum Fathoms	Area (km2)	Target Tows	Allocated Tows	Successful Tows
180 - 330	98 - 180	1,326	74	90	68
330 - 500	180 - 273	1,090	31	33	35
500 - 800	273 - 437	927	10	11	9
800 - 1300	437 - 711	2,228	10	11	0
			125	**145**	**112**

Table 4. Mean warp length and scope by depth interval.

Depth (m)	Mean Warp (m)	Mean Warp (fa)	Mean Scope	Mean Depth (fa)
150 - 200	582	318	2.5	127
200 - 250	683	373	2.5	149
250 - 300	839	459	2.6	174
300 - 350	952	521	2.6	204
350 - 400	995	544	2.3	234
400 - 450	1038	568	2.2	255
450 - 500	1212	662	2.4	282
500 - 550	1257	687	2.3	304
550 - 600	-	-	-	-
600 - 650	1509	825	2.2	382
650 - 700	825	451	1.1	395
700 - 750	1417	775	1.9	419
750 - 800	1463	800	1.8	440

Table 5. Length frequency sampling frequency and minimum sample sizes per species.

Common name	Sampling Frequency	Minimum Sample Size
Aurora rockfish	1	1
Blackfin Sculpin	1	5
Blackgill rockfish	1	1
Boccacio rockfish	1	1
Brown cat shark	1	1
Canary rockfish	1	5
Darkblotch rockfish	1	5
Deepsea sole	1	1
Dogfish	1	5
Dover sole	3	5
Eelpout	1	10
Greenstripe rockfish	1	5
Hake	3	25
Halibut	1	1
Harlequin rockfish	1	1
English sole	1	5
Lingcod	1	1
Long nose skate	1	1
Longspine thornyhead	1	5
Pacific cod	1	1
Pacific flatnose	1	5
Pacific herring	1	25
Pacific ocean perch	2	10
Petrale (Brill) sole	1	1
Pollock	1	5
Ratfish	1	10
Rattail	1	5
Redbanded rockfish	2	5
Redstripe rockfish	1	5
Rex sole	3	10
Rock sole	1	1
Rosethorn rockfish	1	5
Rougheye rockfish	2	5
Sablefish	2	5
Sandpaper skate	1	1
Sharpchin rockfish	1	10
Shortraker rockfish	1	1
Shortspine thornyhead	2	5
Silvergray rockfish	2	5
Slender sole	1	10
Splitnose rockfish	1	5
Turbot	3	10
Widow rockfish	1	5
Yellowmouth rockfish	1	5
Yellowtail rockfish	1	5
All Other Species		5

Table 6. High priority species for age structure sampling.

Species common name	Min. Sample Size	Structure
Pacific Cod	10	2nd Dorsal fin
Rock sole	10	Otolith
Petrale sole	10	Otolith
Lingcod	10	2nd Dorsal fin
Redbanded rockfish	5	Otolith
Bocaccio	1	Otolith
Copper rockfish	1	Otolith
Darkblotched rockfish	1	Otolith
Quillback rockfish	1	Otolith
Shortraker rockfish	1	Otolith
Yelloweye rockfish	1	Otolith

Table 7. Summary of survey operations.

Start: Depart PBS	September 11
End: Offload PBS	October 17
Fishing days	13
Travel days	7
Offload days	4
Weather days	12
Breakdown days	0
Total days	36
Total tows	116
Keeper tows	112
Unusable tows	4
Usable tows per day overall	3.1
Usable tows per fishing day	8.6
Mean catch per keeper tow (kg)	799
Mean number of species per keeper tow	17

Table 8. Catch composition by species group.

Species Category	Number of Taxa	Weight (kg)
All fish	77	89,167
Rockfish	23	77,499
Flatfish	9	6,188
Roundfish	9	4,610
Cartilaginous fish	9	774
Other fish	27	96
Invertebrates	57	279

Table 9. All captured species, ordered by total catch weight, showing number of tows in which the species occurred, total catch weight, maximum and mean per-tow catch weight, and biomass and relative error from bootstrapped area expanded estimates.

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Pacific ocean perch	88	45,716.1	7,921.2	519.5	8,664.7	0.17
Rougheye rockfish	62	7,738.8	1,360.5	124.8	3,654.7	0.44
Silvergray rockfish	61	7,618.0	1,050.1	124.9	1,461.3	0.24
Sharpchin rockfish	65	5,538.5	1,104.5	85.2	975.8	0.30
Shortspine thornyhead	100	4,303.8	178.2	43.0	1,339.7	0.09
Arrowtooth flounder	105	3,401.1	788.6	32.4	966.7	0.19
Pacific hake	64	2,653.8	516.4	41.5	863.6	0.24
Yellowmouth rockfish	21	2,626.7	1,150.1	125.1	418.3	0.45
Dover sole	98	1,559.9	109.6	15.9	568.6	0.12
Sablefish	68	1,314.6	135.7	19.3	555.3	0.16
Redstripe rockfish	33	1,288.4	561.3	39.0	236.9	0.52
Rex sole	104	914.7	43.0	8.8	240.7	0.13
Shortraker rockfish	27	820.8	130.5	30.4	401.7	0.29
Redbanded rockfish	76	443.1	87.0	5.8	85.5	0.19
Rosethorn rockfish	69	385.1	34.7	5.6	72.0	0.11
Longnose skate	33	312.9	32.2	9.5	-	-
Lingcod	26	267.3	26.4	10.3	56.1	0.21
Pacific halibut	27	261.2	40.5	9.7	54.3	0.24
Splitnose rockfish	15	246.5	83.4	16.4	50.1	0.52
Spotted ratfish	62	222.7	59.6	3.6	-	-
Pacific cod	23	206.3	62.8	9.0	40.6	0.43
Widow rockfish	22	198.4	39.4	9.0	38.9	0.32
Yellowtail rockfish	9	128.5	94.3	14.3	27.4	0.73
Spiny dogfish	21	106.1	23.7	5.1	-	-
Longspine thornyhead	13	102.0	30.5	7.8	70.8	0.30
Greenstriped rockfish	18	89.3	22.7	5.0	16.6	0.39
Walleye pollock	35	77.9	10.5	2.2	17.8	0.23
Schoolmaster gonate squid	37	77.2	9.2	2.2	-	-
Canary rockfish	4	61.5	22.6	15.4	12.0	0.52
Primnoa	11	54.5	18.1	5.0	-	-
Bocaccio	9	51.3	9.6	5.7	9.8	0.32
Darkblotched rockfish	5	46.5	34.2	9.3	7.9	0.70
Giant grenadier	5	43.7	22.2	8.7	28.6	0.40
Aleutian skate	5	42.7	18.1	8.5	-	-
Aurora rockfish	7	41.3	27.2	5.9	10.7	0.54
Sandpaper skate	20	40.6	5.5	2.0	-	-
Harlequin rockfish	30	36.6	25.3	1.2	6.7	0.64
Blackfin sculpin	68	33.7	4.0	0.5	6.9	0.17
Prawn	38	31.6	4.1	0.9	-	-
Chum salmon	6	31.5	6.9	5.2	6.1	0.39
Glass sponges	15	30.7	19.1	2.0	-	-
Humboldt squid	4	29.1	13.2	7.3	-	-
Roughtail skate	4	25.6	11.5	6.4	-	-
Popeye	3	25.2	15.5	8.4	15.6	0.61

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Pacific grenadier	4	20.2	15.1	5.0	13.9	0.77
Petrale sole	9	18.1	3.6	2.0	3.8	0.38
Sponges	15	17.8	6.3	1.3	-	-
English sole	9	16.8	5.3	1.9	3.1	0.42
Dusky rockfish	4	11.7	4.4	2.9	2.2	0.53
Pacific flatnose	8	10.7	3.6	1.3	7.3	0.30
Bath sponges	3	10.2	8.9	3.4	-	-
Abyssal skate	1	9.4	9.4	9.4	-	-
Alaska skate	4	8.7	3.2	2.2	-	-
Deepsea sole	5	8.6	2.3	1.7	6.6	0.35
Slender sole	30	7.7	1.1	0.3	1.6	0.25
Yelloweye rockfish	2	5.9	3.4	3.0	1.1	0.72
Brown cat shark	4	5.4	2.5	1.4	-	-
Bigmouth sculpin	1	5.3	5.3	5.3	0.9	0.98
Twoline eelpout	3	4.8	2.0	1.6	2.4	0.50
Robust clubhook squid	1	4.2	4.2	4.2	-	-
Anemone	9	4.1	2.3	0.5	-	-
Fragile urchin	10	3.4	1.2	0.4	-	-
Prowfish	1	2.7	2.7	2.7	0.4	0.97
Jellyfish	8	2.4	0.7	0.3	-	-
Blacktail snailfish	3	1.9	0.9	0.6	1.5	0.59
Sidestripe shrimp	18	1.5	0.8	0.1	-	-
Soft sea cucumber	4	1.5	1.3	0.4	-	-
Giant pacific octopus	2	1.4	0.8	0.7	-	-
Black eelpout	6	1.4	0.9	0.2	0.4	0.50
Grenadiers	1	1.3	1.3	1.3	-	-
Tanner crabs	1	1.2	1.2	1.2	-	-
Flapjack devilfish	1	1.1	1.1	1.1	-	-
Salps	9	1.0	0.6	0.1	-	-
Spiny red sea star	6	0.8	0.3	0.1	-	-
Gorgonian corals	3	0.7	0.4	0.3	-	-
Squids	1	0.5	0.5	0.5	-	-
Paragorgia pacifica	1	0.5	0.5	0.5	-	-
California slickhead	1	0.5	0.5	0.5	0.2	0.94
Diplopteraster multipes	1	0.5	0.5	0.5	-	-
Blackfin poacher	9	0.5	0.2	0.1	0.1	0.41
Stomphia	2	0.4	0.4	0.2	-	-
Basket stars	4	0.4	0.2	0.1	-	-
Bigeye poacher	10	0.4	0.1	0.0	0.1	0.36
Puget sound rockfish	1	0.4	0.4	0.4	0.1	1.00
Bigfin eelpout	1	0.3	0.3	0.3	0.1	0.99
Wattled eelpout	1	0.3	0.3	0.3	0.1	0.96
Cheiraster dawsoni	3	0.3	0.2	0.1	-	-
Oregontriton	4	0.3	0.1	0.1	-	-

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Seaslugs	2	0.3	0.2	0.1	-	-
Threadfin slickhead	1	0.2	0.2	0.2	0.1	0.94
Pacific sanddab	1	0.2	0.2	0.2	0.0	1.00
Northern lampfish	9	0.2	0.1	0.0	0.1	0.37
Sea whip	6	0.2	0.1	0.0	-	-
Pacific viperfish	8	0.2	0.1	0.0	0.1	0.44
Soft corals	1	0.2	0.2	0.2	-	-
Morning sun starfish	2	0.2	0.1	0.1	-	-
Grooved tanner crab	1	0.1	0.1	0.1	-	-
Pearly prickleback	1	0.1	0.1	0.1	0.0	0.98
Cushion star	3	0.1	0.1	0.0	-	-
Spotfin sculpin	2	0.1	0.1	0.1	0.0	0.84
Poraniopsis inflata	2	0.1	0.1	0.0	-	-
Pink shrimp (smooth)	8	0.1	0.0	0.0	-	-
Pinpoint lampfish	1	0.1	0.1	0.1	0.0	0.92
Solaster paxillatus	1	0.1	0.1	0.1	-	-
Shining tubeshoulder	1	0.1	0.1	0.1	0.0	1.04
Sand star	1	0.1	0.1	0.1	-	-
Sunflower starfish	1	0.1	0.1	0.1	-	-
Benthoctopus	1	0.1	0.1	0.1	-	-
Asteronyx loveni	2	0.0	0.0	0.0	-	-
Henricia longispina	2	0.0	0.0	0.0	-	-
Neptuneidae	1	0.0	0.0	0.0	-	-
Deepsea smelts	1	0.0	0.0	0.0	-	-
Gephyreaster swifti	1	0.0	0.0	0.0	-	-
Henricia	3	0.0	0.0	0.0	-	-
Blacktip poacher	2	0.0	0.0	0.0	0.0	0.82
Ophiuridae	4	0.0	0.0	0.0	-	-
Pseudarchaster alascensis	1	0.0	0.0	0.0	-	-
Smalldisk snailfish	1	0.0	0.0	0.0	0.0	0.95
Cookie star	1	0.0	0.0	0.0	-	-
Vampyroteuthidae	1	0.0	0.0	0.0	-	-
Henricia sanguinolenta	1	0.0	0.0	0.0	-	-
Spider crabs	1	0.0	0.0	0.0	-	-
Snailfishes	1	0.0	0.0	0.0	-	-
Yellowleg shrimp	2	0.0	0.0	0.0	-	-
Slipskin	1	0.0	0.0	0.0	0.0	0.98
Glass shrimp	5	0.0	0.0	0.0	-	-
Fish-eating star	1	0.0	0.0	0.0	-	-
Gnathophausia ingens	1	0.0	0.0	0.0	-	-
Sea lilies and feather stars	1	0.0	0.0	0.0	-	-
Isopods	1	-	-	-	-	-
Longfin dragonfish	1	-	-	-	-	-
Redclaw crab	1	-	-	-	-	-
Sea pens	1	-	-	-	-	-
Blue lanternfish	2	-	-	-	-	-

Table 10. Offloaded catch weight by species.

Species	Weight (kg)
Aurora Rockfish	1.8
Bocaccio	52.2
Canary Rockfish	57.2
Darkblotched Rockfish	39.0
Dover Sole	557.9
Dusky Rockfish	8.6
English Sole	3.6
Greenstriped Rockfish	5.9
Harlequin Rockfish	2.3
Lingcod	39.5
Longnose Skate	36.3
Pacific Cod	188.7
Pacific Ocean Perch	47,194.4
Petrale Sole	14.1
Redbanded Rockfish	381.5
Redstripe Rockfish	1,395.7
Rex Sole	49.9
Rockfishes	3.6
Rosethorn Rockfish	83.9
Rougheye Rockfish	8,940.8
Sablefish	176.0
Sharpchin Rockfish	4,134.5
Shortraker Rockfish	509.4
Shortspine Thornyhead	3,822.0
Silvergray Rockfish	8,478.5
Splitnose Rockfish	83.0
Walleye Pollock	2.7
Widow Rockfish	191.9
Yelloweye Rockfish	6.4
Yellowmouth Rockfish	2,727.0
Yellowtail Rockfish	153.8
Total	**79,341.9**

Table 11. Number of samples and number of recorded biological attributes per species sampled.

Species	Samples	Length	Weight	Sex	Maturity	Age
Abyssal skate	1	2	2	2	0	0
Alaska skate	4	7	7	7	0	0
Aleutian skate	5	7	7	7	0	0
Arrowtooth flounder	22	696	396	696	396	160
Aurora rockfish	3	50	7	50	7	7
Blackfin sculpin	19	275	0	275	0	0
Bocaccio	9	10	10	10	10	10
Brown cat shark	1	5	0	5	0	0
Canary rockfish	3	22	0	22	0	0
Chum salmon	4	4	4	1	0	0
Darkblotched rockfish	5	34	34	34	33	33
Dover sole	31	1,188	687	1,188	687	230
English sole	2	18	0	18	0	0
Giant grenadier	2	28	0	28	0	0
Greenstriped rockfish	9	272	129	272	129	59
Harlequin rockfish	24	147	8	147	0	0
Lingcod	25	34	34	34	0	0
Longnose skate	32	54	48	54	0	0
Longspine thornyhead	7	277	57	277	29	57
Pacific cod	16	80	69	80	69	16
Pacific flatnose	3	26	0	26	0	0
Pacific grenadier	3	60	0	60	0	0
Pacific hake	14	740	522	740	520	250
Pacific halibut	27	34	35	2	0	0
Pacific ocean perch	60	2,859	1,935	2,858	1,933	1,121
Petrale sole	2	9	0	9	0	0
Popeye	3	119	0	119	0	0
Puget sound rockfish	1	7	0	7	0	0
Redbanded rockfish	68	429	323	429	312	313
Redstripe rockfish	13	273	114	273	114	56
Rex sole	37	1,455	537	1,455	537	361
Rosethorn rockfish	51	1,179	131	1,179	131	83
Rougheye rockfish	36	1,323	996	1,323	996	612
Roughtail skate	4	4	4	4	0	0
Sablefish	18	302	112	302	112	112
Sandpaper skate	20	32	28	32	0	0
Sharpchin rockfish	36	1,419	663	1,419	660	396
Shortraker rockfish	27	196	196	196	195	196
Shortspine thornyhead	61	3,117	1,814	3,117	1,715	599
Silvergray rockfish	31	835	565	835	565	284
Slender sole	1	8	0	8	0	0
Spiny dogfish	1	9	0	9	0	0
Splitnose rockfish	7	201	146	201	145	146
Spotted ratfish	7	123	0	123	0	0
Walleye pollock	8	106	0	106	0	0
Widow rockfish	7	65	0	65	0	0
Yellowmouth rockfish	11	308	221	308	221	168
Yellowtail rockfish	3	26	0	26	0	0
Total	**784**	**18,474**	**9,841**	**18,438**	**9,516**	**5,269**

Table 12. Numbers of samples (N) and specimens (n) by sample type and species.

Species	Total		Len./Sex		Len./Sex/Wt.		Len./Sex/Wt./Age	
	N	n	N	n	N	n	N	n
Abyssal skate	1	2	0	0	1	2	0	0
Alaska skate	4	7	0	0	4	7	0	0
Aleutian skate	5	7	0	0	5	7	0	0
Arrowtooth flounder	22	696	15	300	4	236	3	160
Aurora rockfish	3	50	2	43	0	0	1	7
Blackfin sculpin	19	275	19	275	0	0	0	0
Bocaccio	9	10	0	0	0	0	9	10
Brown cat shark	1	5	1	5	0	0	0	0
Canary rockfish	3	22	3	22	0	0	0	0
Chum salmon	4	4	0	0	1	1	0	0
Darkblotched rockfish	5	34	0	0	1	1	4	33
Dover sole	31	1,188	19	501	8	457	4	230
English sole	2	18	2	18	0	0	0	0
Giant grenadier	2	28	2	28	0	0	0	0
Greenstriped rockfish	9	272	7	143	1	70	1	59
Harlequin rockfish	24	147	17	139	7	8	0	0
Lingcod	25	34	0	0	25	34	0	0
Longnose skate	32	54	1	4	31	50	0	0
Longspine thornyhead	7	277	6	220	0	0	1	57
Pacific cod	16	80	2	11	12	25	2	16
Pacific flatnose	3	26	3	26	0	0	0	0
Pacific grenadier	3	60	3	60	0	0	0	0
Pacific hake	14	740	5	218	5	272	4	250
Pacific halibut	27	34	0	0	1	1	0	0
Pacific ocean perch	60	2,859	27	924	14	814	19	1,121
Petrale sole	2	9	2	9	0	0	0	0
Popeye	3	119	3	119	0	0	0	0
Puget sound rockfish	1	7	1	7	0	0	0	0
Redbanded rockfish	68	429	23	106	8	10	37	313
Redstripe rockfish	13	273	11	159	1	58	1	56
Rex sole	37	1,455	28	918	3	176	6	361
Rosethorn rockfish	51	1,179	46	1,048	2	48	3	83
Rougheye rockfish	36	1,323	16	327	8	384	12	612
Roughtail skate	4	4	0	0	4	4	0	0
Sablefish	18	302	14	190	0	0	4	112
Sandpaper skate	20	32	2	4	18	28	0	0
Sharpchin rockfish	36	1,419	24	756	5	267	7	396
Shortraker rockfish	27	196	0	0	0	0	27	196
Shortspine thornyhead	61	3,117	31	1,303	20	1,214	10	599
Silvergray rockfish	31	835	20	270	5	281	6	284
Slender sole	1	8	1	8	0	0	0	0
Spiny dogfish	1	9	1	9	0	0	0	0
Splitnose rockfish	7	201	5	55	0	0	2	146
Spotted ratfish	7	123	7	123	0	0	0	0
Walleye pollock	8	106	8	106	0	0	0	0
Widow rockfish	7	65	7	65	0	0	0	0
Yellowmouth rockfish	11	308	7	87	1	53	3	168
Yellowtail rockfish	3	26	3	26	0	0	0	0
Total	**784**	**18,474**	**394**	**8,632**	**195**	**4,508**	**166**	**5,269**

Table 13. Statistics of individual length and weight, and sex proportion by species.

	Length (cm)			Weight (kg)			Sex Proportion	
Species	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Male**	**Female**
Abyssal skate	71	83	77	4.2	5.3	4.7	0.50	0.50
Alaska skate	56	67	61	1.0	1.6	1.3	0.86	0.14
Aleutian skate	56	108	84	1.0	11.9	6.1	0.29	0.71
Arrowtooth flounder	17	79	50	0.4	5.1	1.3	0.33	0.67
Aurora rockfish	29	39	33	0.8	1.0	0.9	0.58	0.42
Blackfin sculpin	8	22	16	-	-	-	0.39	0.61
Bocaccio	69	86	75	4.0	9.0	5.3	0.50	0.50
Brown cat shark	45	57	53	-	-	-	0.60	0.40
Canary rockfish	45	65	56	-	-	-	0.50	0.50
Chum salmon	60	79	72	2.5	6.3	4.9	0.25	0.00
Darkblotched rockfish	35	493	54	0.8	2.6	1.4	0.53	0.47
Dover sole	11	60	40	0.2	2.4	0.8	0.78	0.22
English sole	35	45	39	-	-	-	0.06	0.94
Giant grenadier	37	76	61	-	-	-	0.36	0.64
Greenstriped rockfish	15	35	27	0.1	0.5	0.3	0.60	0.40
Harlequin rockfish	11	30	23	0.1	0.2	0.1	0.50	0.50
Lingcod	67	106	91	2.3	17.4	7.8	0.00	1.00
Longnose skate	57	131	94	1.1	13.9	5.8	0.39	0.61
Longspine thornyhead	10	32	21	0.0	0.3	0.1	0.47	0.53
Pacific cod	45	76	60	0.9	4.2	2.3	0.41	0.59
Pacific flatnose	24	46	33	-	-	-	0.50	0.50
Pacific grenadier	17	78	40	-	-	-	0.48	0.52
Pacific hake	40	68	49	0.5	1.8	0.8	0.40	0.60
Pacific halibut	57	116	76	2.1	40.5	7.5	0.00	0.06
Pacific ocean perch	17	52	40	0.1	1.9	0.9	0.51	0.49
Petrale sole	30	44	39	-	-	-	0.78	0.22
Popeye	25	48	40	-	-	-	0.62	0.38
Puget sound rockfish	14	19	17	-	-	-	0.29	0.71
Redbanded rockfish	13	63	35	0.1	3.9	0.9	0.56	0.44
Redstripe rockfish	6	54	36	0.2	1.0	0.6	0.44	0.56
Rex sole	13	46	33	0.1	0.6	0.3	0.67	0.33
Rosethorn rockfish	13	36	26	0.1	0.5	0.3	0.54	0.46
Rougheye rockfish	16	69	47	0.1	4.9	1.6	0.54	0.46
Roughtail skate	73	114	93	2.3	11.5	6.4	0.50	0.50
Sablefish	49	111	63	1.4	8.1	2.5	0.73	0.27
Sandpaper skate	27	68	57	0.1	3.4	1.3	0.47	0.53
Sharpchin rockfish	14	40	27	0.0	0.8	0.3	0.48	0.52
Shortraker rockfish	26	106	61	0.2	20.6	4.1	0.46	0.54
Shortspine thornyhead	1	67	26	0.0	4.7	0.3	0.52	0.48
Silvergray rockfish	21	67	53	0.6	6.5	1.9	0.46	0.54
Slender sole	24	28	26	-	-	-	0.25	0.75
Spiny dogfish	76	88	83	-	-	-	0.33	0.67
Splitnose rockfish	8	40	28	0.1	0.8	0.4	0.51	0.49
Spotted ratfish	15	56	32	-	-	-	0.45	0.55
Walleye pollock	21	59	35	-	-	-	0.36	0.64
Widow rockfish	42	59	53	-	-	-	0.32	0.68
Yellowmouth rockfish	23	57	47	0.8	2.3	1.7	0.44	0.56
Yellowtail rockfish	45	60	52	-	-	-	0.15	0.85

Table 14. Data collected from net sensors, showing the number of tows from which each data type was collected (total number of survey tows is 130).

Sensor	Attribute	Number of Tows	Number of Records
Global Positioning System (GPS)	Vessel Position - Latitude	111	2,240
	Vessel Position - Longitude	111	2,240
Nmfs Bottom Contact Sensor	Bottom Contact Sensor Tilt Angle	109	31,048
Seabird Sbe19plus Seacat Profiler	Dissolved Oxygen	103	133,798
	Net Depth	103	66,899
	Salinity At Net Depth	103	66,899
	Water Temperature At Net Depth	103	66,899
Seabird Sbe39 Temperature And Pressure Sensor	Net Depth	114	61,358
	Water Temperature At Net Depth	114	61,358

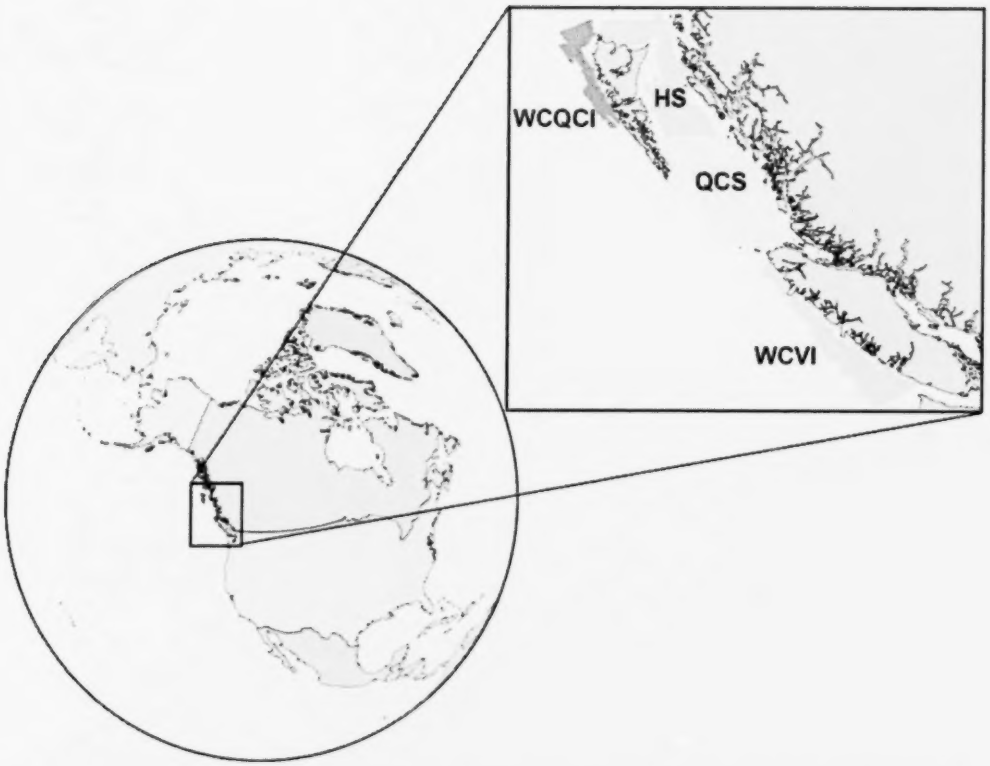

Figure 1. Locations of the current groundfish trawl surveys on the coast of British Columbia, Canada. WCQCI = west coast of Queen Charlotte Islands; HS = Hecate Strait; QCS = Queen Charlotte Sound; WCVI = west coast of Vancouver Island.

Figure 2. The commercial trawler F/V Nemesis.

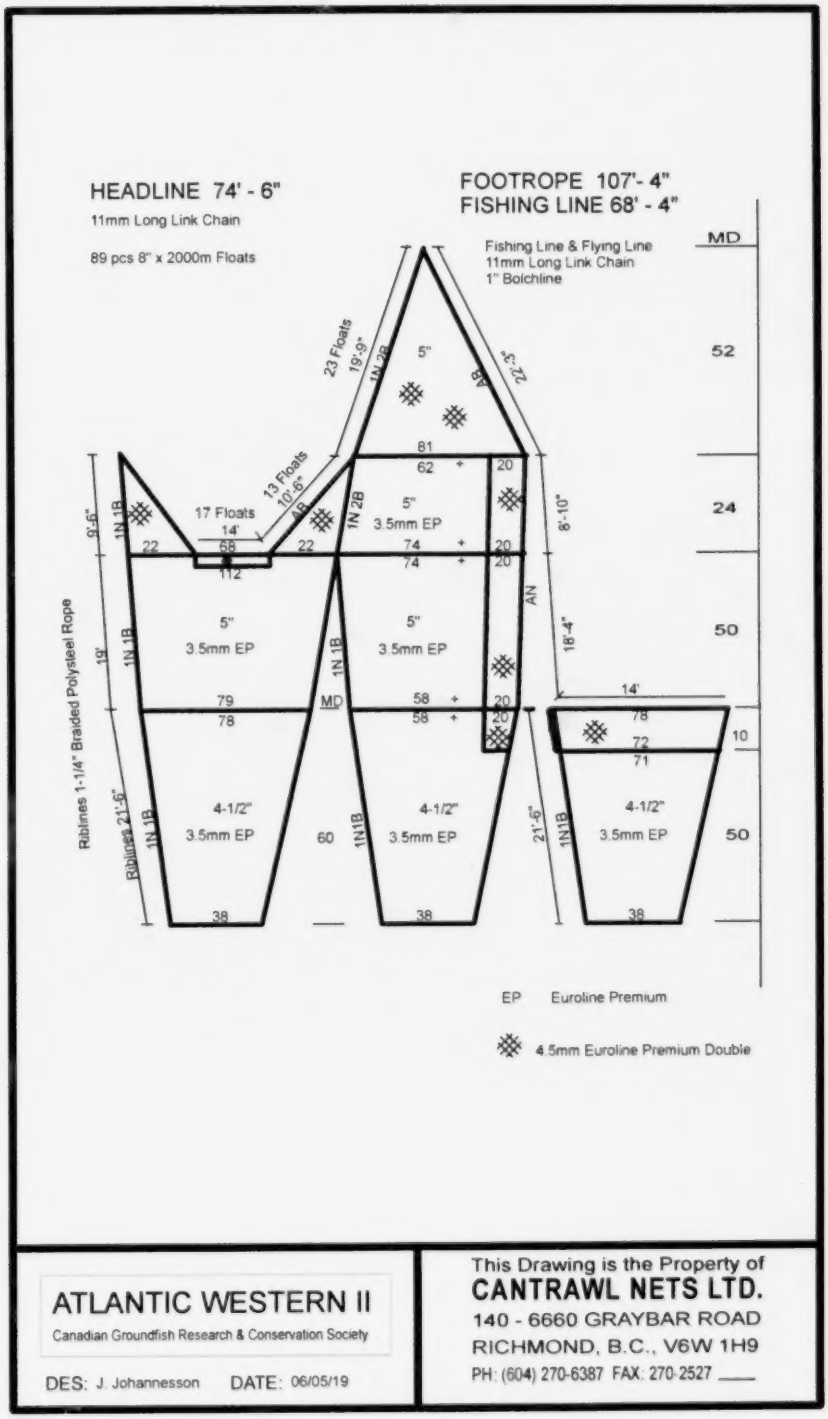

Figure 3: Net diagram provided by the manufacturer of the trawl net.

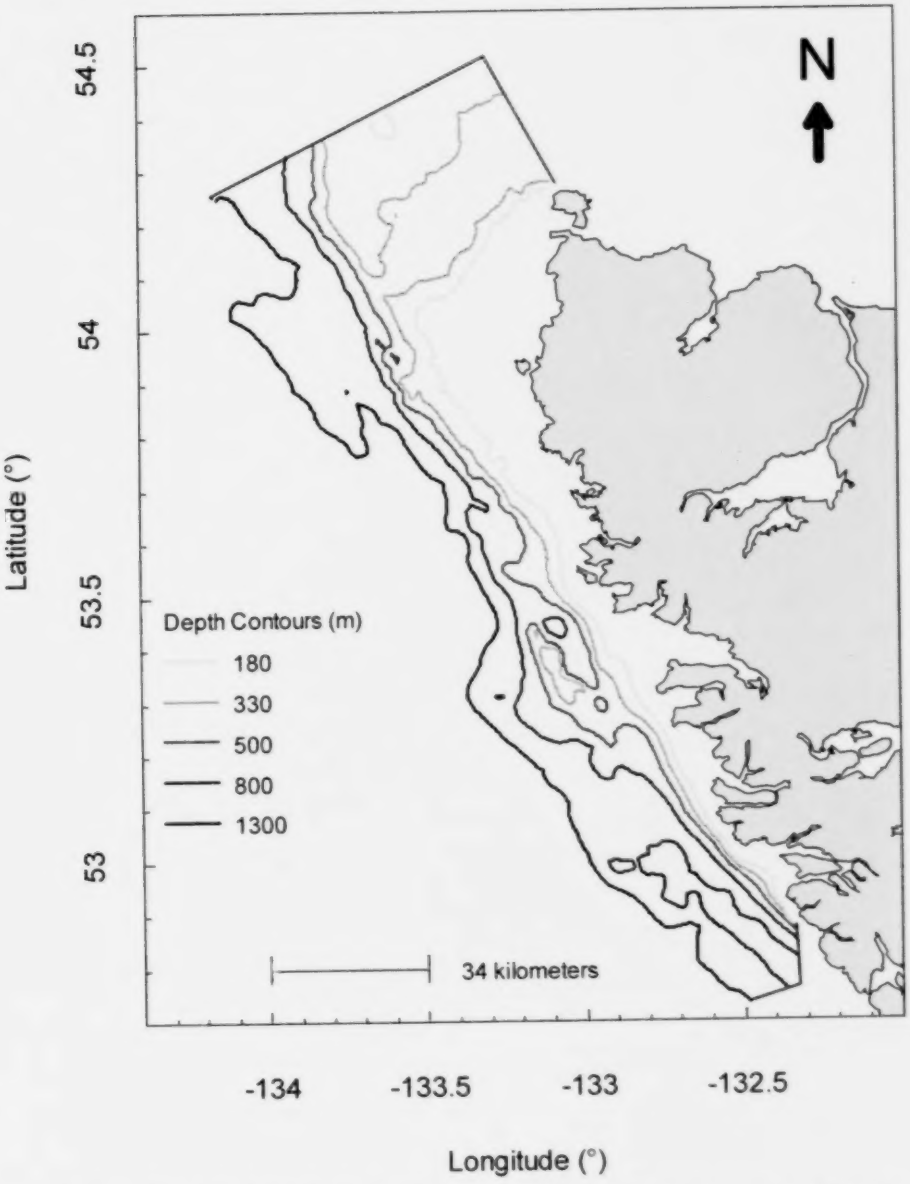

Figure 4. Queen Charlotte Islands study area showing the depth strata covered by the survey.

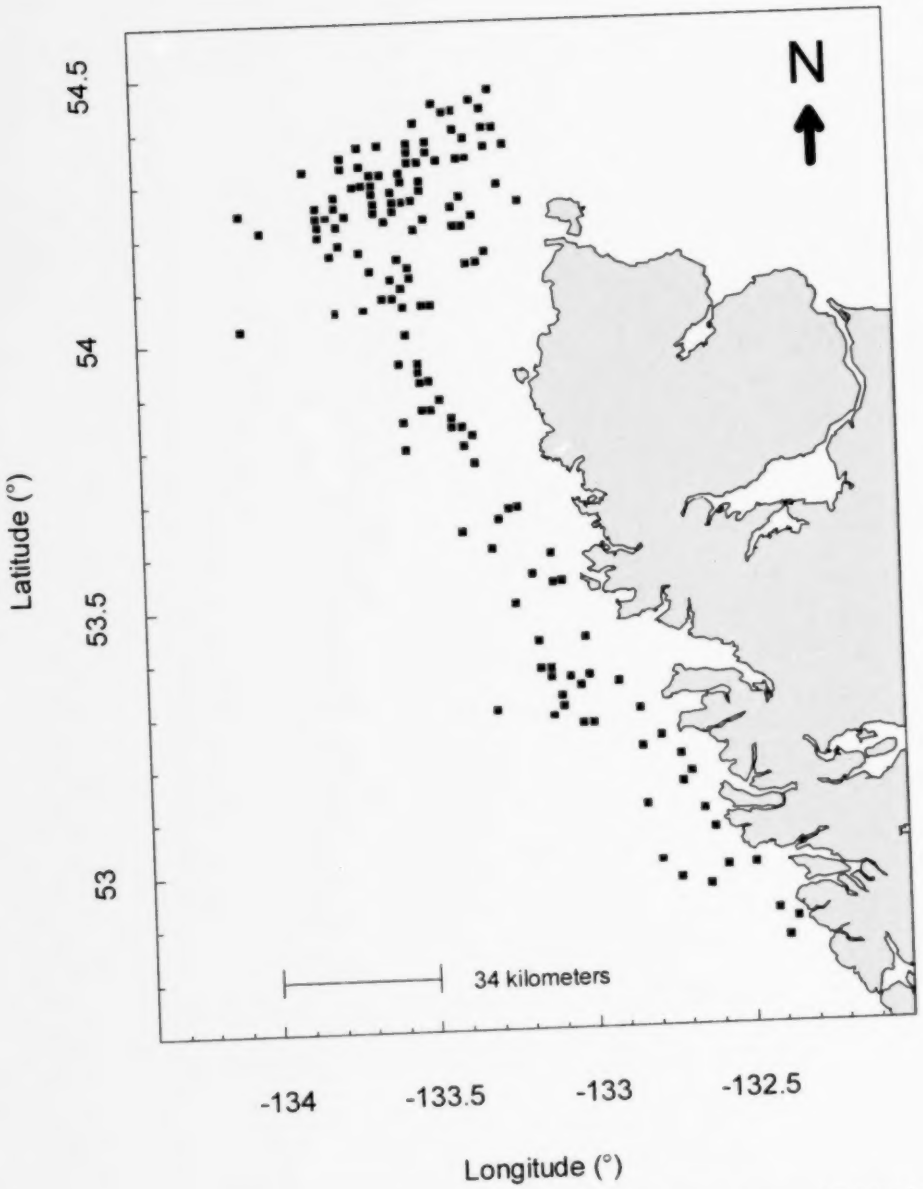

Figure 5. Initial status of the sampling frame showing the 145 randomly selected fishing locations.

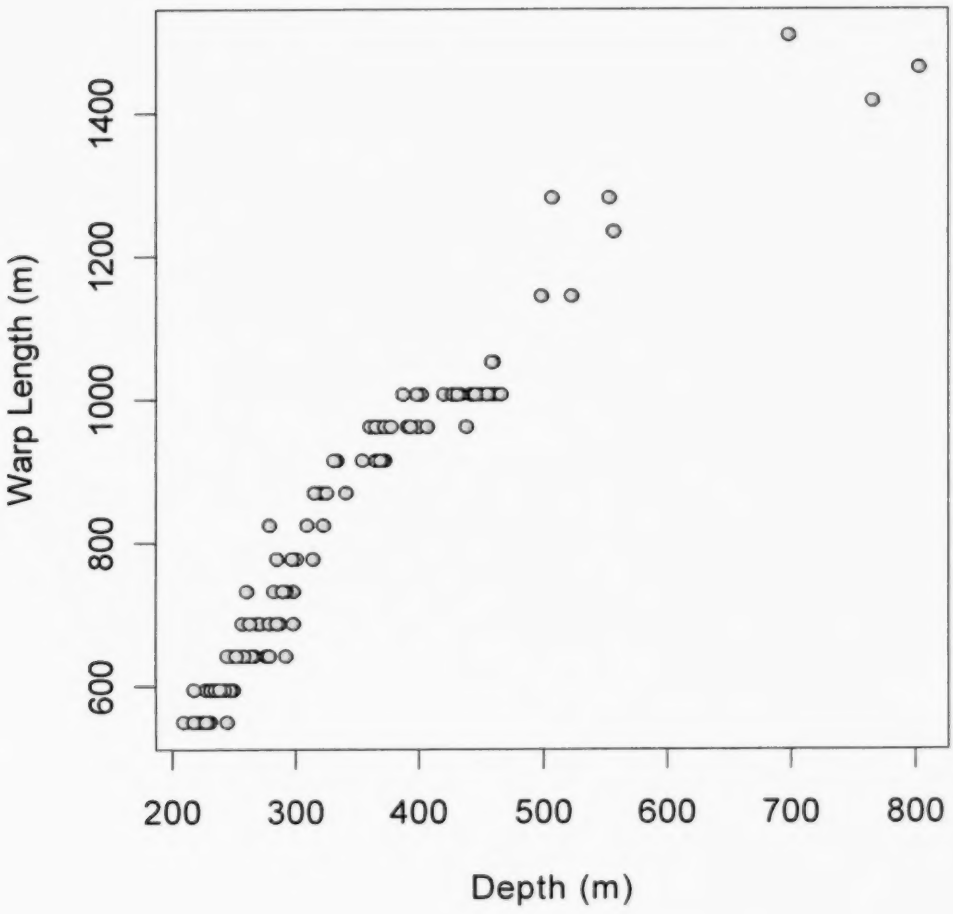

Figure 6. Warp length versus starting depth.

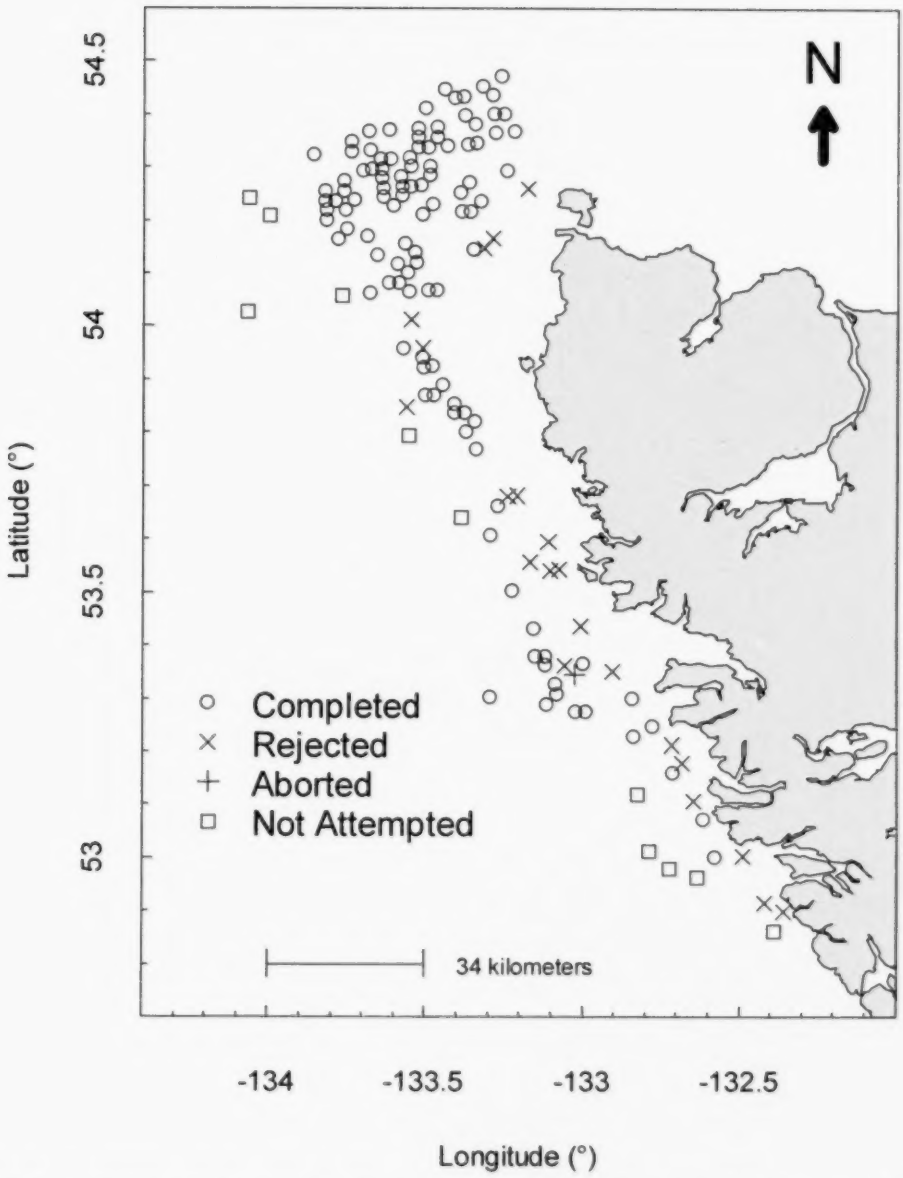

Figure 7. Final status of the sampling frame showing locations that were fished successfully (completed), rejected prior to fishing (rejected), abandoned after one or more unsuccessful fishing attempts (aborted), or not attempted.

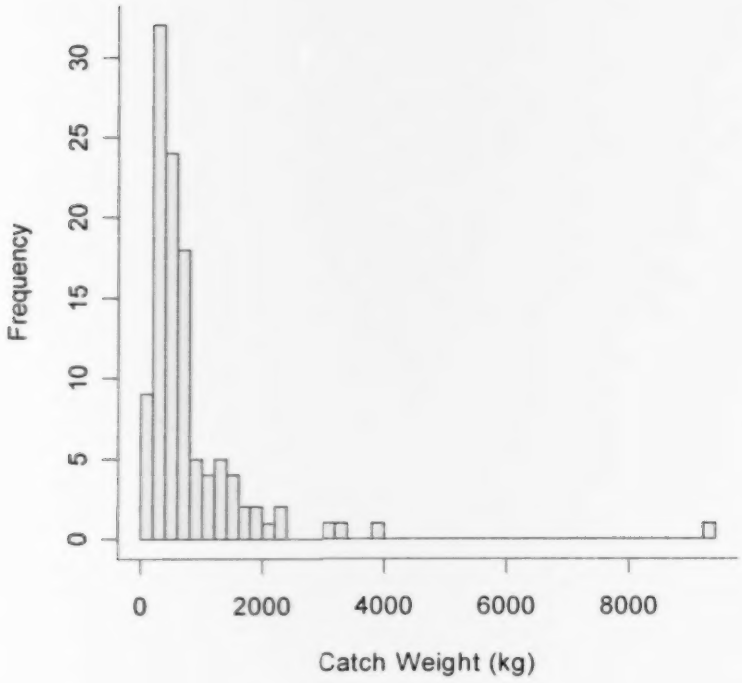

Figure 8. Histogram of catch weight per tow.

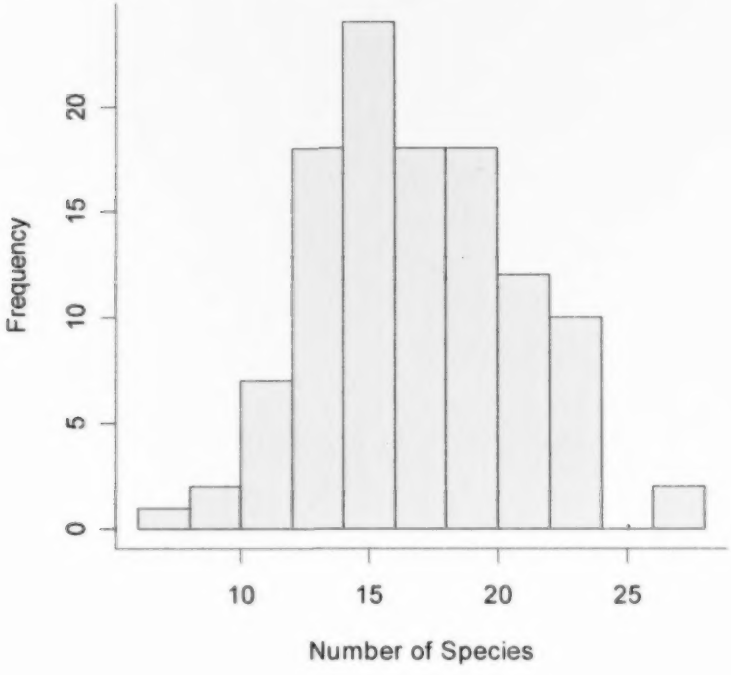

Figure 9. Histogram of number of species caught per tow.

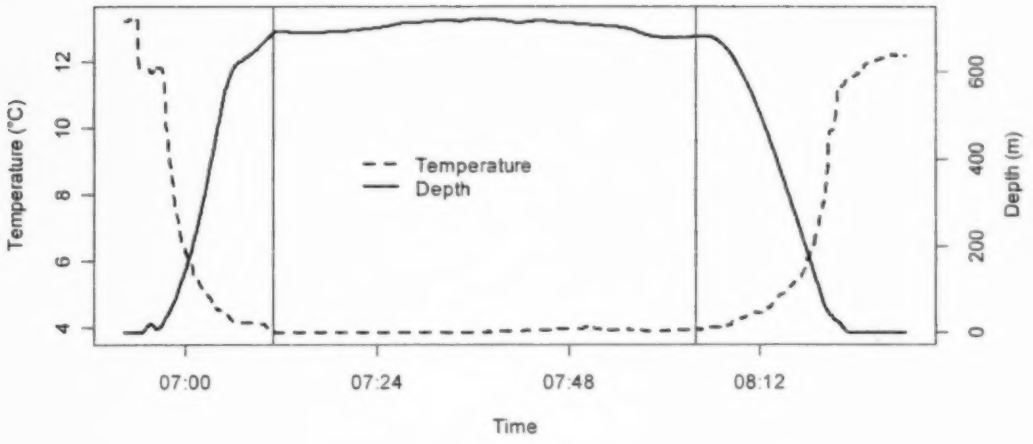

Figure 10. Seabird 39 temperature and depth profile from tow number 1. The vertical lines indicate the start and end of net contact with the sea floor.

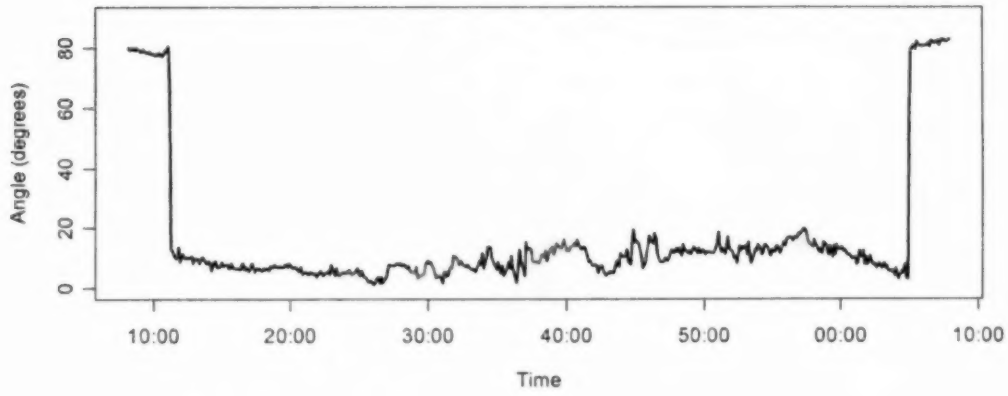

Figure 11. NMFS bottom contact sensor profile from tow number 1.

Species	2006 Biomass (t)	2007 Biomass (t)
Deepsea sole	2.1	6.6
Spiny dogfish	7.4	21.9
Yellowmouth rockfish	151.5	418.3
Widow rockfish	14.2	38.9
Sandpaper skate	7.3	15.6
Silvergray rockfish	791.5	1,461.3
Spotted ratfish	30.8	51.0
Dover sole	373.7	568.6
Arrowtooth flounder	645.7	966.8
Shortraker rockfish	284.0	401.7
Lingcod	40.9	56.1
Shortspine thornyhead	1,068.0	1,339.8
Rex sole	201.8	240.7
Rougheye rockfish	3,242.6	3,654.8
Sharpchin rockfish	965.2	975.8
Pacific halibut	53.7	54.3
Redbanded rockfish	87.9	85.6
Longnose skate	96.0	91.9
Bocaccio	10.9	9.8
Rosethorn rockfish	86.1	72.0
Pacific ocean perch	10,444.2	8,665.2
Pacific hake	1,072.1	863.7
Pacific cod	50.6	40.6
Longspine thornyhead	89.4	70.8
Blackfin sculpin	10.3	6.9
Pacific flatnose	11.0	7.3
Chum salmon	9.7	6.1
English sole	5.2	3.1
Giant grenadier	57.8	28.6
Walleye pollock	37.5	17.8
Slender sole	3.9	1.6

Figure 12. Relative biomass estimates of selected fish species from the 2006 and 2007 west coast Queen Charlotte Islands surveys. Species shown are those with relative errors less than 0.5 in both years and are sorted in decreasing order of relative change in abundance between years.

APPENDIX A: BRIDGE LOG

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
1	Sep 14	06:56	53.2113	132.8232	722	53	4.6	825	262.3	Yes
2	Sep 14	10:09	53.2798	133.0010	257	28	5.7	686	2224.0	Yes
3	Sep 14	12:10	53.2777	133.0302	363	24	5.6	960	172.7	Yes
4	Sep 14	13:59	53.3180	133.0960	301	27	5.4	777	630.1	Yes
5	Sep 14	15:23	53.2987	133.1205	523	46	5.2	1143	135.7	Yes
6	Sep 14	17:23	53.3163	133.0845	245	24	5.9	548	255.1	Yes
7	Sep 14	19:11	53.3148	133.2858	766	41	5.2	1417	27.2	Yes
8	Sep 15	15:38	54.0857	133.5782	369	27	5.4	960	1605.0	Yes
9	Sep 15	17:35	54.0840	133.6213	360	27	5.6	960	909.4	Yes
10	Sep 15	19:20	54.1110	133.5562	369	26	5.4	960	425.5	Yes
11	Sep 16	07:15	54.2838	133.4748	341	24	5.7	869	373.7	Yes
12	Sep 16	08:30	54.2728	133.5150	323	21	5.4	823	285.2	Yes
13	Sep 16	10:03	54.2702	133.5375	314	20	5.4	777	442.8	Yes
14	Sep 16	11:25	54.2875	133.5618	292	19	5.4	640	516.3	Yes
15	Sep 16	12:33	54.2682	133.5642	299	18	5.4	686	601.8	Yes
16	Sep 16	14:03	54.3072	133.5337	277	20	5.2	640	519.6	Yes
17	Sep 16	15:28	54.2643	133.6247	279	20	5.6	640	461.6	Yes
18	Sep 16	16:38	54.2490	133.6250	288	22	5.9	686	614.3	Yes
19	Sep 16	17:59	54.2540	133.5677	314	23	5.9	777	578.2	Yes
20	Sep 16	19:11	54.2362	133.5872	316	15	6.1	869	451.2	Yes
21	Sep 17	10:41	54.2752	133.7575	239	22	5.9	594	9247.9	Yes
22	Sep 17	14:18	54.3278	133.5982	259	21	5.6	640	925.9	Yes
23	Sep 17	15:36	54.3215	133.6377	259	23	5.4	640	723.5	Yes
24	Sep 17	17:21	54.2590	133.7555	245	22	6.1	640	1809.0	Yes
25	Sep 17	18:50	54.2373	133.7305	252	25	6.1	640	3859.3	Yes
26	Sep 18	07:31	54.1363	133.3715	310	23	5.4	823	414.0	Yes
27	Sep 18	09:07	54.2087	133.3953	420	23	5.2	1006	327.6	Yes
28	Sep 18	10:24	54.2100	133.3657	433	14	5.4	1006	133.8	No
29	Sep 18	11:31	54.2133	133.3695	433	13	5.4	1006	316.2	Yes
30	Sep 18	12:47	54.2445	133.4070	427	21	5.9	1006	178.4	Yes
31	Sep 18	13:55	54.2643	133.3722	442	22	5.7	1006	214.9	Yes
32	Sep 18	15:09	54.2390	133.3290	459	22	5.0	1006	365.4	Yes
33	Sep 22	12:36	54.3627	133.4700	243	21	5.7	594	723.5	Yes
34	Sep 22	13:52	54.3468	133.4862	250	21	5.9	594	1353.9	Yes
35	Sep 22	15:28	54.3782	133.5317	243	19	5.4	594	797.5	Yes
36	Sep 22	16:36	54.3608	133.5355	248	22	5.2	594	656.3	Yes
37	Sep 22	17:40	54.3450	133.5288	252	22	6.1	640	864.6	Yes
38	Sep 22	19:03	54.3097	133.4840	272	23	5.2	686	3009.4	Yes
39	Sep 23	07:23	53.9298	133.4817	232	18	5.9	548	158.5	Yes
40	Sep 23	08:20	53.8942	133.4597	228	21	5.7	594	260.8	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
41	Sep 23	09:21	53.8773	133.4728	320	24	5.2	869	345.7	Yes
42	Sep 23	10:52	53.8610	133.4963	373	24	5.9	914	379.8	Yes
43	Sep 23	12:05	53.9188	133.5173	371	17	5.6	914	434.4	Yes
44	Sep 23	13:20	53.9478	133.5143	299	16	4.8	732	301.5	Yes
45	Sep 23	14:56	53.9487	133.5765	499	25	4.8	1143	1603.3	Yes
46	Sep 24	08:22	54.1268	133.6642	318	26	5.4	869	1407.2	Yes
47	Sep 24	11:55	54.1762	133.6775	267	23	5.6	640	1439.1	Yes
48	Sep 24	13:52	54.1753	133.7453	285	24	5.0	777	1263.1	Yes
49	Sep 24	15:32	54.1662	133.7723	398	24	5.0	1006	1087.6	Yes
50	Sep 25	07:46	54.3697	133.2100	455	19	4.6	1006	200.3	Yes
51	Sep 25	09:12	54.4052	133.2360	407	25	4.8	960	183.8	Yes
52	Sep 25	10:11	54.3992	133.2757	393	23	5.0	960	448.0	Yes
53	Sep 25	11:38	54.4017	133.3730	325	25	5.0	869	297.5	Yes
54	Sep 25	12:37	54.3862	133.3485	369	24	5.4	914	318.8	Yes
55	Sep 27	13:02	54.2998	133.2325	466	23	5.4	1006	696.1	Yes
56	Sep 27	15:06	54.3710	133.2770	446	17	5.7	1006	380.6	Yes
57	Sep 27	16:22	54.3462	133.3465	459	25	6.1	1052	427.7	Yes
58	Sep 27	17:57	54.3438	133.3712	331	21	6.3	914	233.0	Yes
59	Sep 27	19:15	54.3378	133.4362	230	17	5.7	548	1040.9	Yes
60	Sep 28	08:31	54.4722	133.2475	279	23	5.2	686	190.8	Yes
61	Sep 28	09:35	54.4433	133.2762	310	25	5.4	823	343.5	Yes
62	Sep 28	10:43	54.4578	133.3088	301	23	5.0	777	181.1	Yes
63	Sep 28	11:55	54.4387	133.3710	298	23	4.8	777	230.7	Yes
64	Sep 28	13:06	54.4410	133.4033	290	23	5.2	732	238.3	Yes
65	Sep 28	14:16	54.4552	133.4273	285	38	5.9	686	232.0	Yes
66	Sep 28	16:00	54.4180	133.4958	248	22	6.5	640	811.3	Yes
67	Sep 28	17:00	54.3782	133.4835	248	20	5.0	640	365.7	Yes
68	Sep 28	18:20	54.3185	133.5517	265	21	5.7	640	1063.3	Yes
69	Sep 29	11:34	54.0735	133.4787	228	21	5.2	548	1307.5	Yes
70	Sep 29	13:16	54.0777	133.4605	219	22	5.2	548	960.3	Yes
71	Sep 29	14:49	54.0738	133.5458	354	24	5.2	914	779.3	Yes
72	Sep 29	16:04	54.1158	133.5367	373	23	5.4	960	770.2	Yes
73	Sep 29	17:10	54.1212	133.5797	365	25	5.2	914	359.7	Yes
74	Sep 29	18:46	54.0535	133.6643	378	8	5.2	960	709.0	No
75	Sep 30	07:22	54.3248	133.8557	554	6	5.2	1280	0.0	No
76	Sep 30	09:01	54.3320	133.8475	508	45	5.2	1280	549.0	Yes
77	Sep 30	10:44	54.2555	133.8123	400	24	5.2	960	538.9	Yes
78	Sep 30	11:48	54.2380	133.8098	391	24	5.0	960	612.7	Yes
79	Sep 30	13:08	54.2210	133.8177	438	22	4.6	960	552.7	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
80	Sep 30	14:26	54.2037	133.8090	462	24	5.2	1006	386.3	Yes
81	Sep 30	16:00	54.2258	133.7482	243	22	5.9	594	2226.2	Yes
82	Sep 30	17:25	54.2375	133.7895	257	23	5.2	686	769.7	Yes
83	Sep 30	19:18	54.0670	133.6882	460	23	5.2	1052	306.5	Yes
84	Oct 01	07:43	53.8615	133.4250	226	22	5.2	548	367.1	Yes
85	Oct 01	08:41	53.8395	133.4063	235	22	5.7	594	558.4	Yes
86	Oct 01	09:42	53.8430	133.3927	219	23	5.6		1226.1	Yes
87	Oct 03	07:43	54.3663	133.6018	219	25	4.6	548	1312.6	Yes
88	Oct 03	08:52	54.3667	133.6708	219	23	5.2	594	3396.4	Yes
89	Oct 03	10:32	54.3498	133.7243	239	24	5.7	594	500.5	Yes
90	Oct 03	11:32	54.3338	133.7257	248	22	5.2	640	388.0	Yes
91	Oct 03	12:42	54.3372	133.6708	252	22	5.9	640	617.1	Yes
92	Oct 03	13:45	54.2975	133.6575	263	22	5.6	686	1486.3	Yes
93	Oct 03	14:47	54.2965	133.6948	257	23	5.6	640	2078.5	Yes
94	Oct 03	16:08	54.2953	133.6265	267	22	5.6	640	1151.2	Yes
95	Oct 03	17:14	54.2837	133.6365	270	14	5.7	686	746.0	Yes
96	Oct 08	09:32	54.2417	133.4695	402	27	5.0	1006	240.3	Yes
97	Oct 09	09:26	54.1327	133.5407	369	23	5.2	960	279.3	Yes
98	Oct 09	10:32	54.1498	133.5652	365	25	5.6	960	495.7	Yes
99	Oct 09	11:49	54.2083	133.5093	387	24	5.4	1006	271.1	Yes
100	Oct 09	16:26	53.8222	133.3552	217	21	5.4	548	681.3	Yes
101	Oct 09	17:33	53.8107	133.3890	283	23	5.4	732	454.4	Yes
102	Oct 09	18:31	53.7733	133.3428	292	23	5.4	732	466.6	Yes
103	Oct 10	07:55	53.4958	133.2155	444	42	5.4	1006	599.2	Yes
104	Oct 10	09:41	53.6072	133.3067	334	25	5.7	914	753.4	Yes
105	Oct 10	11:04	53.6718	133.2772	804	44	4.1	1463	325.1	Yes
106	Oct 11	08:07	53.4243	133.1518	232	21	5.9	594	680.8	Yes
107	Oct 11	09:24	53.3835	133.1325	221	21	5.0	548	640.3	Yes
108	Oct 11	10:27	53.3842	133.1523	449	42	4.6	1006	595.7	Yes
109	Oct 11	11:55	53.3713	133.1295	232	23	5.0	594	1818.4	Yes
110	Oct 11	14:02	53.3527	133.0425	217	12	5.2	548	215.2	No
111	Oct 11	14:58	53.3758	133.0198	698	47	4.4	1509	275.1	Yes
112	Oct 11	17:39	53.3040	132.8587	261	16	5.7	732	582.1	Yes
113	Oct 12	08:09	53.2545	132.7937	279	22	5.0	823	477.8	Yes
114	Oct 12	11:03	53.0735	132.6283	210	22	5.6	548	418.7	Yes
115	Oct 12	12:03	53.0077	132.5757	431	31	5.0	1006	1413.7	Yes
116	Oct 12	15:32	53.1555	132.7203	557	25	3.3	1234	199.4	Yes

APPENDIX B: CATCH BY TOW

Species	1	2	3	4	5	6	7	8	9	10
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	2.48	2.00	0.67	1.31	-	-	-	17.34	6.84	16.10
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	3.97	0.31	1.18	-	2.04	-	0.70	0.06	0.03
Bocaccio	-	5.54	-	-	-	-	-	-	-	-
Brown cat shark	0.93	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	26.78	3.07	20.28	0.35	14.99	2.07	1.93	18.95	29.70	17.90
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	22.16	-	-	-	-	-	1.96	-	-	-
Greenstriped rockfish	-	0.96	-	-	-	5.83	-	-	-	-
Harlequin rockfish	-	-	-	-	-	-	-	0.06	-	0.70
Lingcod	-	-	-	-	-	-	-	-	6.22	-
Longnose skate	-	-	5.81	-	-	11.21	-	-	-	-
Longspine thornyhead	17.35	-	-	-	0.61	-	4.37	-	-	-
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	2.20	-	-	-	0.26	0.02	0.90	-	-	-
Pacific grenadier	2.72	-	-	-	-	-	0.94	-	-	-
Pacific hake	-	4.75	24.06	-	4.82	-	-	7.56	2.96	14.20
Pacific halibut	-	-	-	-	-	-	-	-	-	-
Pacific ocean perch	-	842.97	26.18	558.18	7.65	159.08	-	401.27	422.29	113.20
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	5.81	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	-	0.66	0.94	-	3.31	-	-	-	0.70
Redstripe rockfish	-	2.89	-	-	-	4.80	-	-	-	-
Rex sole	-	1.01	2.50	0.34	4.62	2.12	-	4.12	3.46	16.10
Rosethorn rockfish	-	34.73	-	3.57	-	7.54	-	2.36	0.84	0.30
Rougheye rockfish	-	54.58	41.51	1.53	7.54	3.30	-	969.38	310.38	157.60
Roughtail skate	2.30	-	-	-	-	-	-	-	-	-
Sablefish	135.70	-	2.77	-	3.82	-	3.82	2.06	-	2.50
Sandpaper skate	-	-	1.21	-	1.33	-	-	2.98	5.54	-
Sharpchin rockfish	-	0.31	-	-	-	-	-	-	0.22	0.60
Shortraker rockfish	-	-	16.28	-	4.86	2.68	-	-	-	-
Shortspine thornyhead	39.23	54.42	28.45	52.04	80.29	8.52	9.07	178.20	120.86	81.90
Silvergray rockfish	-	60.60	1.66	2.74	-	36.54	-	-	-	-
Slender sole	-	-	-	0.15	-	-	-	-	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	-	-
Spotted ratfish	-	-	-	-	-	-	-	-	-	1.40
Walleye pollock	-	-	-	-	-	-	-	-	-	-
Widow rockfish	-	1.71	-	1.98	-	0.83	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	1150.05	-	4.92	-	2.45	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	4.61	0.48	0.34	0.83	4.91	2.77	4.23	0.03	0.04	2.31
Total	262.27	2224.04	172.69	630.06	135.70	255.11	27.22	1605.01	909.41	425.54

Appendix B continued.

Species	11	12	13	14	15	16	17	18	19	20
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	10.00	9.80	5.20	8.80	7.30	2.30	12.80	15.10	5.70	12.70
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.30	0.10	0.10	0.13	0.26	0.15	0.08	0.16	-	0.40
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	2.50	2.60	-	-	-	-	-	-	34.20	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	5.00	12.70	10.30	4.30	3.30	2.10	0.70	4.20	6.90	14.60
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	0.30	0.23	-	-	-	-	-	0.13
Lingcod	-	-	-	7.60	2.30	9.60	-	-	-	-
Longnose skate	3.30	-	-	-	-	-	-	-	-	13.90
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	-	-	-	-	-	-	-	1.80	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	-	-	2.70	0.70	2.90	2.70
Pacific halibut	-	-	22.40	-	-	-	-	4.36	-	-
Pacific ocean perch	168.80	172.30	336.30	438.00	529.00	457.40	411.00	541.20	434.70	286.20
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	3.30	1.70	-	2.10	0.80	1.90	2.50	4.00	3.20	1.00
Redstripe rockfish	-	0.50	-	-	-	0.90	-	0.50	-	-
Rex sole	1.20	6.40	6.30	8.00	7.60	5.00	3.80	-	9.40	10.70
Rosethorn rockfish	2.40	2.50	3.20	4.50	4.80	7.90	5.30	5.50	3.30	4.90
Rougheye rockfish	42.90	0.40	0.80	-	-	0.40	0.50	-	-	1.50
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	9.90	6.00	8.70	-	3.60	-	-	7.80	2.90	14.20
Sandpaper skate	0.10	-	0.80	-	-	-	-	-	-	-
Sharpchin rockfish	0.40	0.70	-	0.40	0.30	13.60	3.90	0.50	0.08	0.30
Shortraker rockfish	-	-	-	-	-	-	-	-	-	-
Shortspine thornyhead	120.80	66.20	44.00	36.70	35.70	-	11.90	27.90	61.84	76.20
Silvergray rockfish	-	-	-	1.90	-	13.90	2.90	-	6.90	4.90
Slender sole	-	-	0.20	0.24	0.09	-	-	-	0.10	-
Spiny dogfish	-	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	0.40	-	-	-
Spotted ratfish	-	1.00	1.30	1.70	5.20	0.70	1.50	1.40	3.20	2.60
Walleye pollock	-	-	0.60	-	-	-	0.70	-	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	2.20	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	2.83	2.34	2.30	1.71	1.50	1.50	0.93	0.93	1.03	4.24
Total	373.73	285.24	442.80	516.31	601.75	519.55	461.61	614.25	578.15	451.17

Appendix B continued.

Species	21	22	23	24	25	26	27	28	29	30
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	4.90	3.76	7.40	8.30	8.30	228.10	1.50	1.60	17.50	12.20
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	5.30	-	-	-	-	-
Blackfin sculpin	-	0.25	0.30	0.60	0.40	0.10	-	0.21	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	2.80	0.37	3.40	4.00	1.70	24.20	73.80	7.50	42.90	1.00
Dusky rockfish	-	-	-	-	2.50	-	-	-	-	-
English sole	-	-	-	-	-	4.70	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	0.80	-	-	-	-	-	-
Harlequin rockfish	3.80	-	0.10	0.40	0.80	-	-	-	-	-
Lingcod	-	-	-	-	10.20	-	8.38	-	-	-
Longnose skate	-	-	-	-	-	-	21.80	-	4.18	2.52
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	-	2.40	8.80	8.90	-	-	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	0.30	-	-
Pacific hake	-	-	-	-	-	15.60	62.60	31.70	50.00	46.20
Pacific halibut	16.39	4.40	-	4.00	-	3.18	-	-	-	-
Pacific ocean perch	7921.20	764.64	581.90	1496.90	3595.33	42.50	-	1.50	-	1.00
Petrale sole	-	-	-	3.60	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	87.00	2.74	3.70	3.60	5.90	2.90	0.90	-	-	-
Redstripe rockfish	58.80	-	0.70	4.30	1.20	-	-	-	-	-
Rex sole	4.10	3.89	5.10	10.80	4.60	24.20	18.20	4.30	16.00	0.80
Rosethorn rockfish	11.20	6.14	8.00	8.92	10.20	-	-	-	-	-
Rougheye rockfish	-	-	-	-	-	1.40	83.40	32.60	48.90	35.30
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	-	-	-	3.89	-	11.80	1.80	19.10	53.40
Sandpaper skate	-	-	-	-	-	-	-	-	1.80	-
Sharpchin rockfish	918.40	107.30	92.80	186.50	131.33	0.10	-	-	-	-
Shortraker rockfish	-	-	-	-	-	20.80	-	-	-	-
Shortspine thornyhead	3.90	7.68	15.40	-	22.70	29.50	39.00	48.90	110.20	12.00
Silvergray rockfish	186.20	21.51	-	60.80	40.10	13.20	-	-	-	-
Slender sole	-	0.09	0.30	0.20	-	1.10	-	-	-	-
Spiny dogfish	-	-	-	-	-	1.20	-	-	-	-
Splitnose rockfish	-	-	-	-	0.40	1.10	-	-	-	-
Spotted ratfish	-	0.48	-	0.60	-	0.01	0.90	-	0.70	3.60
Walleye pollock	-	0.56	-	-	-	-	1.30	-	-	1.20
Widow rockfish	6.80	1.53	-	1.90	1.90	-	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	22.40	-	-	3.60	2.10	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	-	0.56	2.10	0.40	1.55	0.08	4.02	3.35	4.91	9.22
Total	9247.89	925.90	723.60	1809.02	3859.30	413.97	327.60	133.76	316.19	178.44

Appendix B continued.

Shortraker rockfish	-	-	-	-	-	-	-	-	-	-
Shortspine thornyhead	18.20	93.60	8.30	13.50	0.60	18.20	23.10	43.20	-	-
Silvergray rockfish	-	-	88.80	42.40	120.10	56.60	54.70	35.90	99.30	147.90
Slender sole	-	-	0.10	-	-	0.30	0.10	-	-	0.30
Spiny dogfish	-	-	-	-	-	-	-	2.00	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	0.15	0.01
Spotted ratfish	-	-	0.80	1.30	-	-	-	0.20	0.05	2.00
Walleye pollock	-	-	1.10	-	0.40	-	0.70	-	2.50	5.20
Widow rockfish	-	-	8.30	11.70	-	-	20.60	13.50	-	1.60
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	27.90	159.40	-	-	-	28.20	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	1.30	1.30	2.70
Other	5.16	0.04	1.75	3.82	3.34	2.75	2.60	3.43	-	-
Total	214.88	365.43	723.53	1353.91	797.54	656.25	864.62	3009.37	158.50	260.79
Species	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	1.60	11.90	-	-	-	-
Arrowtooth flounder	49.20	27.70	177.80	65.40	17.30	12.20	6.30	5.20	10.50	15.50
Aurora rockfish	-	-	-	-	-	-	-	-	5.60	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.22	0.10	0.07	0.06	-	2.90	1.50	2.30	0.08	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	1.00	-	-	-	6.20	-	-
Deepsea sole	-	-	-	-	1.20	-	-	-	-	-
Dover sole	4.00	22.60	21.50	10.80	27.70	60.20	3.50	32.60	29.60	68.70
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	1.00	-	-	-	-	-	-
Giant grenadier	-	-	-	-	5.40	-	-	-	-	-
Greenstriped rockfish	0.80	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	-	-	-	-	-	0.20	-	-
Lingcod	-	-	-	-	-	9.90	-	-	-	-
Longnose skate	-	-	13.42	10.90	-	-	17.02	-	-	7.08
Longspine thornyhead	-	-	-	-	-	-	-	-	2.00	-
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	18.60	88.70	37.70	30.10	32.90	-	-	0.70	12.20	13.90
Pacific halibut	-	-	-	-	-	20.70	14.70	-	-	-
Pacific ocean perch	144.20	136.10	79.80	51.90	-	1237.00	1209.80	1035.50	20.90	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	22.60	10.50	4.40	3.20	-	1.90	3.40	6.20	0.90	-
Redstripe rockfish	-	-	-	-	-	0.50	-	-	-	-
Rex sole	3.00	4.00	1.20	0.90	6.90	8.30	5.90	1.60	0.40	14.30
Rosethorn rockfish	2.00	0.20	1.30	0.10	-	8.10	10.90	10.50	-	-
Rougheye rockfish	-	38.20	29.60	7.10	1360.50	-	-	73.60	923.20	2.10
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	7.90	7.80	4.59	-	38.70	-	4.50	-	37.30	55.60
Sandpaper skate	-	-	-	-	2.80	-	-	-	-	3.25
Sharpchin rockfish	0.50	-	-	3.00	-	2.50	81.60	39.00	-	-

Appendix B continued.

Species	41	42	43	44	45	46	47	48	49	50
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	1.60	11.90	-	-	-	-
Arrowtooth flounder	49.20	27.70	177.80	65.40	17.30	12.20	6.30	5.20	10.50	15.50
Aurora rockfish	-	-	-	-	-	-	-	-	5.60	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.22	0.10	0.07	0.06	-	2.90	1.50	2.30	0.08	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	1.00	-	-	-	6.20	-	-
Deepsea sole	-	-	-	-	1.20	-	-	-	-	-
Dover sole	4.00	22.60	21.50	10.80	27.70	60.20	3.50	32.60	29.60	68.70
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	1.00	-	-	-	-	-	-
Giant grenadier	-	-	-	-	5.40	-	-	-	-	-
Greenstriped rockfish	0.80	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	-	-	-	-	-	0.20	-	-
Lingcod	-	-	-	-	-	9.90	-	-	-	-
Longnose skate	-	-	13.42	10.90	-	-	17.02	-	-	7.08
Longspine thornyhead	-	-	-	-	-	-	-	-	2.00	-
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	18.60	88.70	37.70	30.10	32.90	-	-	0.70	12.20	13.90
Pacific halibut	-	-	-	-	-	20.70	14.70	-	-	-
Pacific ocean perch	144.20	136.10	79.80	51.90	-	1237.00	1209.80	1035.50	20.90	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	22.60	10.50	4.40	3.20	-	1.90	3.40	6.20	0.90	-
Redstripe rockfish	-	-	-	-	-	0.50	-	-	-	-
Rex sole	3.00	4.00	1.20	0.90	6.90	8.30	5.90	1.60	0.40	14.30
Rosethorn rockfish	2.00	0.20	1.30	0.10	-	8.10	10.90	10.50	-	-
Rougheye rockfish	-	38.20	29.60	7.10	1360.50	-	-	73.60	923.20	2.10
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	7.90	7.80	4.59	-	38.70	-	4.50	-	37.30	55.60
Sandpaper skate	-	-	-	-	2.80	-	-	-	-	3.25
Sharpchin rockfish	0.50	-	-	3.00	-	2.50	81.60	39.00	-	-
Shortraker rockfish	-	2.70	8.80	22.20	77.40	-	-	4.80	11.30	-
Shortspine thornyhead	54.00	30.10	51.40	16.30	30.30	15.80	30.80	41.60	38.00	19.50
Silvergray rockfish	13.30	-	-	-	-	12.80	42.70	3.10	-	-
Slender sole	0.20	0.20	0.40	-	-	-	-	-	-	-
Spiny dogfish	3.50	-	-	3.10	-	-	-	-	-	-
Splitnose rockfish	1.40	-	-	71.70	-	-	-	-	-	-
Spotted ratfish	0.50	-	-	-	-	1.40	5.60	-	-	-
Walleye pollock	0.40	2.00	2.30	2.00	-	-	-	-	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	19.33	8.90	0.10	0.71	0.62	1.12	0.86	-	-	0.41
Total	345.65	379.80	434.38	301.47	1603.32	1407.22	1439.08	1263.10	1091.98	200.34

Appendix B continued.

Species	51	52	53	54	55	56	57	58	59	60
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	21.00	58.40	20.47	25.40	46.98	33.92	40.59	13.13	6.58	3.29
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	-	0.30	-	-	-	-	0.55	1.72	0.40
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	13.56	69.60	18.39	18.81	29.94	109.59	53.16	2.05	3.91	9.32
Dusky rockfish	-	-	-	-	-	-	-	-	4.43	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	-	-	0.15	0.30	-	-	-	-	-	-
Lingcod	-	-	1.82	-	-	-	-	-	-	-
Longnose skate	5.25	15.40	-	-	5.42	32.24	31.95	2.16	-	-
Longspine thornyhead	-	-	-	-	-	-	-	0.24	-	-
Pacific cod	-	-	-	-	-	-	-	-	3.13	2.01
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	30.16	115.40	107.90	167.56	516.38	103.78	110.09	12.43	-	81.35
Pacific halibut	-	-	-	10.54	-	-	-	-	-	-
Pacific ocean perch	-	-	44.46	7.44	-	-	-	11.85	335.85	17.03
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	1.82	1.90	3.28	1.61	-	-	-	6.78	1.53	13.35
Redstripe rockfish	-	-	-	-	-	-	-	-	103.55	-
Rex sole	7.70	39.30	41.52	24.08	6.80	14.54	20.34	1.53	6.61	8.53
Rosethorn rockfish	-	-	-	-	-	-	-	3.98	10.49	0.18
Rougheye rockfish	27.72	69.80	7.16	2.65	32.58	5.69	10.08	23.96	-	2.41
Roughtail skate	-	-	-	-	-	-	-	11.54	-	-
Sablefish	38.05	45.40	11.59	8.31	6.33	62.01	70.62	9.26	-	-
Sandpaper skate	-	-	-	1.47	-	0.82	1.96	1.46	1.17	-
Sharpchin rockfish	-	0.40	0.64	-	-	-	-	1.14	132.29	3.79
Shortraker rockfish	-	-	-	-	-	-	-	33.83	-	-
Shortspine thornyhead	32.36	20.90	31.56	40.11	48.12	12.58	72.61	83.25	21.37	30.49
Silvergray rockfish	-	-	-	-	-	-	-	6.39	130.41	1.49
Slender sole	-	-	-	-	-	-	-	-	0.02	-
Spiny dogfish	-	-	1.52	-	-	1.24	-	2.96	-	-
Splitnose rockfish	-	-	0.20	-	-	-	-	0.35	-	-
Spotted ratfish	2.44	5.00	1.26	7.36	-	4.19	6.10	-	1.53	3.52
Walleye pollock	1.33	6.10	2.61	3.42	-	-	-	-	0.62	4.03
Widow rockfish	-	-	-	-	-	-	-	-	7.27	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	2.30	265.44	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	2.38	0.38	2.63	0.04	3.57	-	10.23	1.87	3.00	9.59
Total	183.77	447.98	297.46	319.10	696.12	380.60	427.73	233.01	1040.92	190.78

Appendix B continued.

Species	61	62	63	64	65	66	67	68	69	70
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	15.78	9.65	26.63	10.86	15.73	5.57	3.96	11.25	32.25	55.09
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.43	0.50	0.09	-	-	0.09	0.56	0.07	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	6.78
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	16.35	2.72
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	12.74	8.74	9.15	0.95	0.51	1.37	-	4.25	-	-
Dusky rockfish	-	-	-	-	-	-	-	-	3.32	-
English sole	-	-	-	0.75	0.74	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	0.85	4.92
Harlequin rockfish	-	-	-	-	-	-	-	0.21	-	-
Lingcod	-	12.71	-	5.83	9.01	-	7.39	-	9.77	26.39
Longnose skate	10.52	-	-	7.06	9.30	-	-	-	-	-
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	1.78	-	-	-	4.92	2.22	-	51.28	62.80
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	87.60	12.31	0.82	2.10	-	-	-	-	-	-
Pacific halibut	-	-	-	2.05	12.04	-	-	-	4.88	-
Pacific ocean perch	119.72	68.39	91.37	106.26	122.84	640.54	240.65	800.37	-	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	21.43	4.86	2.97	6.54	2.33	3.99	5.82	1.53	-	-
Redstripe rockfish	-	-	-	-	-	0.53	0.80	0.75	0.68	0.98
Rex sole	21.31	7.39	31.35	42.97	33.75	6.95	2.86	17.74	-	1.26
Rosethorn rockfish	-	0.48	-	-	-	0.93	6.52	5.74	-	-
Rougheye rockfish	11.05	0.65	4.54	5.21	-	-	-	-	-	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	-	-	6.12	0.88	-	-	-	-	-
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	-	-	0.82	-	0.04	8.75	29.88	38.54	0.53	0.82
Shortraker rockfish	-	-	-	-	-	-	-	-	-	-
Shortspine thornyhead	39.24	44.13	34.29	6.84	3.60	5.56	5.61	20.87	-	-
Silvergray rockfish	-	-	5.93	10.26	12.21	75.85	54.00	140.30	1050.08	737.39
Slender sole	-	-	-	-	0.01	0.36	-	0.11	-	-
Spiny dogfish	-	-	-	-	-	-	-	-	5.70	1.39
Splitnose rockfish	-	-	0.37	-	-	-	-	-	-	-
Spotted ratfish	1.49	1.50	1.33	-	-	-	0.79	1.41	1.34	4.38
Walleye pollock	-	-	2.35	5.47	6.92	2.71	-	-	0.86	0.30
Widow rockfish	-	-	-	-	-	-	-	5.58	35.28	39.42
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	2.05	52.66	-	13.55	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	94.30	10.94
Other	2.16	8.03	18.71	19.01	-	0.52	4.62	1.02	-	4.73
Total	343.47	181.12	230.72	238.28	231.96	811.30	365.68	1063.29	1307.47	960.31

Appendix B continued.

Species	71	72	73	74	75	76	77	78	79	80
Abyssal skate	-	-	-	-	-	9.44	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	10.04	-	-	-	1.04
Arrowtooth flounder	77.01	25.54	37.88	3.78	-	76.97	71.90	39.83	38.70	24.26
Aurora rockfish	-	-	-	-	-	4.00	-	-	0.86	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.91	0.47	0.08	-	-	-	1.05	-	0.06	-
Bocaccio	-	-	-	-	-	-	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	10.62	19.42	17.06	-	-	67.44	13.86	14.89	31.44	37.18
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	-	-	-	-	-
Harlequin rockfish	0.14	0.41	0.05	-	-	-	0.20	-	-	-
Lingcod	17.10	-	-	-	-	-	-	-	-	-
Longnose skate	-	16.50	-	-	-	-	-	6.53	-	-
Longspine thornyhead	-	-	-	5.86	-	5.16	-	-	-	0.70
Pacific cod	-	-	-	-	-	-	-	-	-	-
Pacific flatnose	-	-	-	-	-	3.58	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	37.50	40.80	3.54	-	20.84	14.26	39.52	37.20	47.86
Pacific halibut	4.24	-	6.04	-	-	-	-	-	-	-
Pacific ocean perch	473.84	217.52	111.24	15.03	-	-	15.60	42.24	4.58	-
Petrale sole	-	-	3.48	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	1.12	-	-	-	-	-	0.22	2.15	0.54	-
Redstripe rockfish	-	-	-	-	-	-	-	-	-	-
Rex sole	4.00	19.52	41.34	4.03	-	26.66	3.92	3.10	8.86	5.38
Rosethorn rockfish	4.83	-	3.28	-	-	-	0.96	1.21	-	-
Rougheye rockfish	24.54	273.78	32.53	595.89	-	13.18	291.83	313.78	304.63	143.39
Roughtail skate	-	9.18	-	-	-	-	-	-	-	-
Sablefish	34.64	5.62	-	58.65	-	13.34	14.32	35.02	20.74	4.66
Sandpaper skate	-	-	1.40	-	-	3.44	-	1.31	-	-
Sharpchin rockfish	-	0.44	-	-	-	-	-	-	-	-
Shortraker rockfish	-	3.66	-	3.20	-	130.50	10.63	15.68	38.05	68.88
Shortspine thornyhead	121.14	139.57	59.62	19.04	-	154.32	100.12	79.78	66.72	51.48
Silvergray rockfish	-	-	-	-	-	-	-	-	-	-
Slender sole	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	4.73	-	-	-	-	-	-	-	-	-
Splitnose rockfish	-	-	-	-	-	-	-	-	-	-
Spotted ratfish	-	0.74	4.88	-	-	-	-	3.62	-	1.44
Walleye pollock	-	-	-	-	-	-	-	-	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	0.46	0.32	0.03	0.01	-	10.08	0.02	14.05	0.30	-
Total	779.32	770.19	359.71	709.03	-	548.99	538.89	612.71	552.68	386.27

Appendix B continued.

Species	81	82	83	84	85	86	87	88	89	90
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	-	7.32	17.34	10.65	16.08	20.92	4.84	4.81	6.18	11.43
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.40	1.78	0.04	0.03	0.08	0.12	-	-	0.39	0.26
Bocaccio	-	-	-	-	6.71	9.59	-	-	-	-
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	19.90	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	-	7.38	8.58	-	0.71	2.53	2.31	1.38	0.82	1.44
Dusky rockfish	-	-	-	-	-	-	-	-	1.41	-
English sole	-	-	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	22.69	19.33	2.07	1.04	-	-	-
Harlequin rockfish	25.30	0.23	-	0.43	-	-	0.41	-	-	-
Lingcod	-	-	-	5.59	-	13.46	-	-	-	-
Longnose skate	-	-	-	-	3.71	-	-	-	-	-
Longspine thornyhead	-	-	6.42	-	-	-	-	-	-	-
Pacific cod	-	-	-	4.57	0.25	3.29	6.59	-	18.22	3.43
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	-	-	-	-	-	-	-	-	-
Pacific halibut	5.72	25.63	-	-	-	4.88	-	2.85	-	-
Pacific ocean perch	566.70	597.41	4.72	-	4.09	-	1064.91	1024.69	96.58	153.81
Petrale sole	-	-	-	-	2.16	-	2.39	-	1.39	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	-	4.43	-	9.98	1.01	17.28	5.06	20.12	2.40	4.64
Redstripe rockfish	23.90	-	-	9.62	2.84	561.32	7.18	49.88	2.30	2.13
Rex sole	-	0.13	0.70	3.15	3.63	4.39	2.49	2.50	8.24	5.85
Rosethorn rockfish	16.30	3.90	-	8.05	2.15	19.04	0.27	5.69	6.05	6.11
Rougheye rockfish	-	14.39	225.56	-	-	-	-	-	-	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	-	-	8.58	-	-	-	2.89	-	-	4.14
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	1104.45	58.16	-	4.28	1.91	22.71	3.03	889.56	294.24	168.45
Shortraker rockfish	-	7.23	28.24	-	-	-	-	-	-	-
Shortspine thornyhead	15.20	30.54	5.87	-	0.72	-	0.49	-	8.33	5.61
Silvergray rockfish	468.25	7.50	-	264.47	474.03	494.21	189.84	941.75	46.67	16.24
Slender sole	-	-	-	-	0.15	-	-	-	0.07	-
Spiny dogfish	-	-	-	1.87	-	4.90	-	-	2.83	2.37
Splitnose rockfish	-	-	-	-	-	-	-	-	-	-
Spotted ratfish	-	3.62	-	1.70	7.24	0.84	12.28	11.94	1.58	1.19
Walleye pollock	-	-	-	1.58	2.95	-	-	-	0.57	0.42
Widow rockfish	-	-	-	-	-	-	2.41	13.75	-	-
Yelloweye rockfish	-	-	-	2.53	-	3.37	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	3.84	427.50	1.98	-
Yellowtail rockfish	-	-	-	1.57	8.16	6.71	-	-	-	-
Other	-	0.07	0.42	8.73	0.45	2.36	0.32	-	0.21	0.47
Total	2226.22	769.72	306.47	361.49	558.36	1213.89	1312.59	3396.42	500.46	387.99

Appendix B continued.

Species	91	92	93	94	95	96	97	98	99	100
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	-	-	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	-	-	-	-
Arrowtooth flounder	8.46	8.67	7.96	8.75	11.15	8.84	10.76	33.54	19.85	10.15
Aurora rockfish	-	-	-	-	-	-	-	-	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	0.76	-	-	0.04	-	-	-	0.21	-	-
Bocaccio	-	-	-	-	-	-	-	-	-	4.33
Brown cat shark	-	-	-	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	22.56
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	-	-	-	-	-	-
Dover sole	0.94	1.51	1.96	0.34	0.38	4.70	23.24	38.14	1.92	-
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	-	-	-	-	-	-	-	-	-	1.47
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	0.19	-	-	-	-	-	-	-	-	0.97
Harlequin rockfish	-	-	-	0.08	-	-	-	-	0.12	0.39
Lingcod	-	5.16	11.24	6.21	-	-	-	-	-	11.64
Longnose skate	-	-	-	-	-	6.06	4.05	5.07	10.10	-
Longspine thornyhead	-	-	-	-	-	-	-	-	-	-
Pacific cod	-	-	-	1.50	-	-	-	-	-	2.79
Pacific flatnose	-	-	-	-	-	-	-	-	-	-
Pacific grenadier	-	-	-	-	-	-	-	-	-	-
Pacific hake	-	1.18	-	0.56	1.09	28.48	19.21	86.22	44.52	-
Pacific halibut	-	-	2.94	-	-	-	7.78	-	-	-
Pacific ocean perch	469.77	1241.63	1790.12	988.22	652.09	-	44.57	154.15	53.67	-
Petrale sole	-	-	-	-	-	-	-	-	-	-
Popeye	-	-	-	-	-	-	-	-	-	-
Redbanded rockfish	2.36	5.95	7.20	5.63	1.60	-	1.16	1.92	-	19.01
Redstripe rockfish	-	-	-	-	-	-	-	-	-	351.58
Rex sole	2.51	3.97	3.84	2.53	0.95	0.63	31.99	20.54	0.51	15.59
Rosethorn rockfish	3.38	8.30	7.56	9.24	4.64	-	0.14	1.96	-	8.61
Rougheye rockfish	-	-	-	-	-	80.08	98.50	53.66	83.47	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	6.51	-	-	4.55	-	52.56	9.38	20.76	25.51	-
Sandpaper skate	-	-	-	-	-	-	1.15	3.69	-	-
Sharpchin rockfish	74.14	165.38	191.72	41.29	29.32	0.61	-	-	-	79.35
Shortraker rockfish	-	-	-	-	-	-	-	-	-	-
Shortspine thornyhead	12.30	12.60	15.28	8.77	8.08	47.12	26.20	70.68	25.58	0.76
Silvergray rockfish	33.82	30.84	28.68	69.68	33.70	-	-	-	-	123.35
Slender sole	-	-	-	-	0.12	-	-	-	-	0.06
Spiny dogfish	-	-	-	2.26	-	-	-	-	-	23.66
Splitnose rockfish	-	-	-	0.09	-	-	-	-	-	-
Spotted ratfish	1.51	-	-	-	2.70	2.93	-	3.34	3.29	0.76
Walleye pollock	-	0.73	-	0.78	-	-	-	0.78	-	-
Widow rockfish	-	-	-	-	-	-	-	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-	-	-	-	3.67
Yellowtail rockfish	-	-	-	-	-	-	-	-	-	-
Other	0.47	0.33	9.96	0.69	0.15	8.25	1.20	1.04	2.53	0.59
Total	617.12	1486.25	2078.46	1151.21	745.97	240.26	279.33	495.70	271.07	681.29

Appendix B continued.

Species	101	102	103	104	105	106	107	108	109	110
Abyssal skate	-	-	-	-	-	-	-	-	-	-
Alaska skate	-	-	1.57	2.85	-	-	-	-	-	-
Aleutian skate	-	-	-	-	-	-	18.11	-	-	-
Arrowtooth flounder	42.08	170.76	5.96	27.46	77.67	-	-	0.78	-	-
Aurora rockfish	-	-	1.61	-	-	-	-	1.68	-	-
Bigmouth sculpin	-	-	-	-	-	-	-	-	-	-
Blackfin sculpin	-	0.11	-	0.87	-	0.07	-	-	-	-
Bocaccio	-	4.76	-	-	-	-	-	-	5.45	-
Brown cat shark	-	-	2.45	-	-	-	-	-	-	-
Canary rockfish	-	-	-	-	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-	-	-	-	-
Deepsea sole	-	-	-	-	2.32	-	-	-	-	-
Dover sole	1.04	10.06	27.28	9.51	54.45	10.69	-	21.14	-	-
Dusky rockfish	-	-	-	-	-	-	-	-	-	-
English sole	1.41	5.30	-	-	-	-	-	-	-	-
Giant grenadier	-	-	-	-	-	-	-	-	-	-
Greenstriped rockfish	-	-	-	-	-	4.25	1.38	-	1.89	-
Harlequin rockfish	0.37	0.28	-	-	-	-	-	-	-	0.04
Lingcod	-	-	-	-	-	-	-	-	-	-
Longnose skate	-	-	-	11.58	-	-	-	4.23	-	-
Longspine thornyhead	-	-	-	-	30.45	-	-	0.68	-	-
Pacific cod	-	2.52	-	-	-	-	-	-	-	-
Pacific flatnose	-	-	-	-	1.43	-	-	-	-	-
Pacific grenadier	-	-	-	-	15.12	-	-	-	-	-
Pacific hake	0.72	105.64	4.40	-	-	-	-	8.74	-	-
Pacific halibut	-	-	-	-	-	4.96	2.68	-	-	-
Pacific ocean perch	235.06	41.36	6.13	417.61	-	581.61	507.35	12.48	631.44	97.80
Petrale sole	-	-	-	-	-	-	1.22	-	-	-
Popeye	-	-	-	-	3.83	-	-	-	-	-
Redbanded rockfish	28.50	5.60	-	1.18	-	1.24	-	-	-	-
Redstripe rockfish	-	-	0.60	-	-	4.08	1.83	-	32.57	4.92
Rex sole	3.55	2.42	13.88	8.46	1.43	20.72	1.38	8.25	-	-
Rosethorn rockfish	1.31	0.66	-	3.37	-	2.99	0.10	-	-	3.69
Rougheye rockfish	-	-	356.29	99.44	5.92	-	-	319.70	-	-
Roughtail skate	-	-	-	-	-	-	-	-	-	-
Sablefish	7.16	3.28	2.42	1.54	75.69	2.47	0.83	7.74	-	-
Sandpaper skate	-	-	-	-	-	-	-	-	-	-
Sharpchin rockfish	4.66	1.30	-	-	-	-	-	-	-	39.92
Shortraker rockfish	-	-	56.14	43.98	-	-	-	84.66	-	-
Shortspine thornyhead	16.32	30.60	120.51	102.75	49.95	36.90	-	123.28	-	0.40
Silvergray rockfish	7.51	2.30	-	2.28	-	9.06	98.60	-	713.54	52.27
Slender sole	-	0.53	-	0.59	-	1.04	0.09	-	-	-
Spiny dogfish	6.35	-	-	2.71	-	-	-	-	-	-
Splitnose rockfish	83.37	72.58	-	-	-	0.76	-	-	-	-
Spotted ratfish	1.16	-	-	-	-	-	-	-	-	-
Walleye pollock	1.93	-	-	-	-	-	-	-	-	-
Widow rockfish	-	-	-	-	-	-	6.67	-	-	-
Yelloweye rockfish	-	-	-	-	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	17.14	-	-	-	-	433.34	16.12
Yellowtail rockfish	1.48	-	-	-	-	-	-	-	-	-
Other	10.45	6.55	-	0.05	6.87	-	0.10	2.31	0.15	0.01
Total	454.43	466.61	599.24	753.37	325.13	680.84	640.34	595.67	1818.38	215.17

Appendix B continued.

Species	111	112	113	114	115	116
Abyssal skate	-	-	-	-	-	-
Alaska skate	-	-	1.03	-	3.22	-
Aleutian skate	-	-	-	-	-	-
Arrowtooth flounder	4.01	14.88	105.36	59.91	788.61	46.46
Aurora rockfish	-	-	-	-	27.15	0.37
Bigmouth sculpin	-	-	-	-	-	-
Blackfin sculpin	-	0.41	0.41	-	-	-
Bocaccio	-	-	4.01	-	-	-
Brown cat shark	1.54	-	-	-	-	0.52
Canary rockfish	-	-	-	-	-	-
Darkblotched rockfish	-	-	-	-	-	-
Deepsea sole	2.00	-	-	-	2.09	1.03
Dover sole	57.12	0.46	5.12	-	29.16	16.23
Dusky rockfish	-	-	-	-	-	-
English sole	-	-	-	-	-	-
Giant grenadier	12.08	-	-	-	-	2.05
Greenstriped rockfish	-	-	-	2.50	-	-
Harlequin rockfish	-	-	-	-	-	-
Lingcod	-	24.72	-	23.13	-	-
Longnose skate	-	-	1.11	-	-	4.13
Longspine thornyhead	14.57	-	-	-	-	7.42
Pacific cod	-	-	-	-	-	-
Pacific flatnose	1.33	-	-	-	-	0.96
Pacific grenadier	1.37	-	-	-	-	-
Pacific hake	-	8.95	22.69	-	19.88	3.42
Pacific halibut	-	40.48	10.47	7.14	6.56	-
Pacific ocean perch	-	357.21	106.77	7.28	-	-
Petrale sole	-	-	-	-	-	-
Popeye	15.53	-	-	-	-	-
Redbanded rockfish	-	4.72	5.87	-	-	-
Redstripe rockfish	-	-	-	54.74	-	-
Rex sole	-	0.27	0.37	2.00	1.72	0.76
Rosethorn rockfish	-	2.26	1.54	-	-	-
Rougheye rockfish	-	1.98	29.68	-	412.08	9.16
Roughtail skate	2.56	-	-	-	-	-
Sablefish	118.32	-	22.78	10.86	33.94	13.55
Sandpaper skate	-	-	-	-	-	-
Sharpchin rockfish	-	12.34	4.40	0.36	-	-
Shortraker rockfish	-	17.66	38.48	6.77	30.82	33.80
Shortspine thornyhead	41.08	42.32	84.32	-	55.06	59.27
Silvergray rockfish	-	15.96	1.63	148.34	-	-
Slender sole	-	0.40	0.05	-	-	-
Spiny dogfish	-	5.21	3.15	23.41	-	-
Splitnose rockfish	-	13.62	-	-	-	-
Spotted ratfish	-	6.38	4.87	59.55	3.38	-
Walleye pollock	-	-	-	10.49	-	-
Widow rockfish	-	10.02	3.42	2.26	-	-
Yelloweye rockfish	-	-	-	-	-	-
Yellowmouth rockfish	-	-	-	-	-	-
Yellowtail rockfish	-	-	-	-	-	-
Other	3.59	1.80	20.24	-	0.06	0.28
Total	275.10	582.05	477.77	418.74	1413.73	199.41